PULP & PAPER INDUSTRY

"The Cellulose Age"

The Management Journal Covering North America's Wood Pulp, Paper, Paperboard, Fibreboard and Cellulose Industries.

Presents - -

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. . . which is not just another "special issue" in the often over-worked promotional sense of that phrase. This is a serious effort to appraise and evaluate this industry in all its phases of development and operation.

The Institute of Paper Chemistry in Appleton, Wis., in its official bulletin, called last year's North American Review Number "an excellent source of statistical information on all phases of the industry." The secretary of a Canadian association said it brought together "more pertinent facts about the industry than I have ever seen before between two covers" and his opposite number in a large American association called it "almost a must requirement as reference material." "Excellently organized and fact-crammed" were the generous words by another publication in this field.

Six hundred students in a pulp and paper course at New York University were advised by their course chairman early this year to use the North American Review Number as one of their "best sources of information."

If we continue to deserve such praise it will be due to our experienced, capable and hard-working staff of editors, active in the field from coast to coast and from Alaska to Mexico. Underlying their efforts has been this guiding principle—that if any single region of this industry in North America is to prosper, then all regions must prosper, and to that end we dedicate this journal.

* * *

In recent years, we have selected as the lead article in each North American Review Number, some subject of transcendent importance and vital concern to all of the executives in this industry, as well as all of its employes. A director of the company, a mill manager, a technical supervisor, an engineer, a superintendent, a purchasing agent or an investor might not be able to do anything much, personally, about the subject selected. Or again, he might. But, if he is concerned with his own personal future as well as that of his company, he would want to know as much as he could about it.

So, in language everyone of them could understand, and as graphically as we could, we presented a survey of future wood resources two years ago. Last year, we made a continent-wide survey of how mills handled their labor relations. This year, with modernization and expansion in full swing, hand in hand with efforts to increase operational efficiency, we chose the subject: "Engineering Advancement in the North American Pulp and Paper Industry."

But, again—this is not intended as an article for engineers alone. We think it is of vital concern to all of our readers.

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The Role of ENGINEERING

MODERNIZATION AND EXPANSION-NEED FOR SAVING MATERIALS AND CUTTING COSTS-ENHANCE ITS SCOPE

THIS is the year of emphasis on engineering in the pulp and paper industry.

On one hand, there are the expansion and modernization and improvement programs in which virtually every company in the industry is participating to some extent. These programs are largely in the hands of engineers.

On the other hand, there is the ever-increasing need for reducing waste effort and the waste of materials. The key men in these endeavors are, also, the engineers.

For the past several months, PULP & PAPER Industry editors have literally combed the North American continent for information and illustrations of the advancement of engineering in the industry. The results of their work are embodied in this article, which is divided substantially in two parts:

1. Comments of some of the leading executives and engineers in the industry on this subject. These interviews not only summarize and interpret recent engineering advancements, but also present some interesting opinions on where there is need of better engineering.

2. Examples of new or interesting engineering developments. In some mills it was a new piece of equipment; in others, the way a material was used, and in still others, it was a technique or a system or a plan of organization.

Everything seems to have a broad or deep social and political significance these days—and perhaps engineering in the pulp and paper industry has, too.

The Engineer and Social Progress Are Linked by Ralph Hayward

There are undoubtedly a lot of leaders in this industry qualified to appraise the social and political role of the engineer, but probably none is better qualified than Ralph A. Hayward, president of Kalamazoo Vegetable Parchment Co., who is also a regent and former faculty member of the University of Michigan, a former president of TAPPI and now a director of the Canadian Pulp & Paper Association. A quarter century ago he began his career as resident engineer at Espanola, Ont., where he has just recently built a modern pulp mill, embodying new ideas which he developed.

"During the past 15 years we have witnessed many social changes which will materialize into social progress, if we can increase our productivity sufficiently to make them real," he told PULP & PAPER Industry.

"The public, which is partially represented by organized labor, and the politicians who represent the public have promised to deliver goods and values to the American people in excess of their productive capacity. This is a natural and a normal development and comes about because of the amazing progress that has been made by industry over the past 50 years.

"Either we have to increase our production per man sufficient to equal these commitments or we will have inflation," Mr. Hayward warned. "It is not the temper of the American people to look to increasing personal effort either by more intense activities or by longer hours of work. As a matter of fact, the American people are looking to less work per hour and fewer hours of work in the process of production and distribution of wealth.

"It is my firm conviction that the only way we can measure up to expectations of the people is through intensive engineering developments. By intensifying our efforts along this line we can still further substitute horsepower for manpower and we can increase efficiency by the introduction of all types and kinds of equipment that will intensify production without the added effort of the individual operators.

"The opportunities along this line are unlimited. We are in a period when money is available at low interest rates so it is possible to finance developments of this kind. We have a great reservoir of engineering knowledge and ability which can be applied to these engineering problems."

"In the KVP mills," he said, "we are making a critical examination of every operation and every movement of material with a view to seeing what can be done from an engineering standpoint to increase our productivity per man. We also are spending a great deal of time on new products and new processes so that we may further diversify our line and increase the usage of paper."

Hammermill Enlarges Staff

On every hand mills have reported enlargement of their engineering staffs. Executives of Puget Sound Pulp & Timber Co., one of the biggest sulfite mills in the world, report that they long ago learned the lesson that they must have specialists in engineering on their own staff as they are 100 miles or farther from any city where they might get expert engineering attention, and they observed that many other mills are becoming cognizant of the fact that staff experts must supplement the services of outside consultants.

The equipment companies likewise have been increasing their engineering staffs, a typical example being one of the big paper machine manufacturers in Ohio which has a new engineering department and

It's Importance in 1947 GREATER than EVER

SOME RECENT EXAMPLES OF HOW MODERN ENGINEERING HAS ADVANCED THIS INDUSTRY

41 engineers and draftsmen, twice the number it employed in 1936.

"We have enlarged our staff of engineers and technicians," said Norman W. Wilson, president of Hammermill Paper Co. "The achievements of better quality, lower costs, wider product diversification and a host of collateral benefits can only be obtained by intelligent and continued expenditures in the fields of research and engineering.

"History has proven that future rewards stem from the current activities in these fields and we intend to continue to explore and use the opportunities offered by a comprehensive technical program."

Mahler Outlines K. C.'s Philosophy

One of the companies which has one of the largest engineering staffs in the industry is Kimberly-Clark Corp., and Ernst Mahler, executive vice president, explained to PULP & PAPER Industry that "engineering has always seemed of outstanding importance to us if we were to be concerned about the long term outlook and if we were to keep ahead of obsolescence and so stay competitive at all times."

Mr. Mahler, who not only has had an opportunity in this country to see first hand the growth of several industries but had similar opportunities in Russia, Germany and elsewhere in Europe at the war's end as an official envoy, said it was necessery for Kimberly-Clark to design certain equipment for new products which was not ready-made.

"We do not design equipment which other engineering organizations have spent years in perfecting," he said. "But we do engineer, however, our own process and machine design in such fields as coating of magazine and book paper in the manufacturing of creped wadding products of many kinds. This we have done to a much greater extent than average and for a much longer time.

"I think it will be interesting to see how most of the important engineering changes appear through a process of gradual evolution. As we grew and as each additional production unit was built, our engineering department's attention has been focused upon the bottlenecks of the previous installation and so it usually overcame existing limitations of design. Equipment has doubled or tripled in speed, for instance, as engineering effort and experience increased some machine speeds from 600 feet per minute to a present-day speed ranging up to 2,500 feet, and coincidentally doubled the machine width from the early model.

"While it may seem otherwise from the example above, engineering developments at Kimberly-Clark are seldom of a spectacular nature; they develop slowly and so the magnitude may be scarcely apparent even to engineers who have been part of our company for a long time —excepting on those get-together occasions when all of us reminisce about old times.

"That this is so very important to any manufacturer who may be planning any sizeable engineering department," said Mr. Mahler. "One of the big factors in our engineering department's ability to produce results at Kimberly-Clark is in the stability or permanency of employment in that department. Expense must be anticipated by industry so that the engineering department can be held together, in good times and bad times or much of the continuity of experience is lost. At Kimberly-Clark engineering is considered a necessary part of the team which has—since 1872—helped to keep the times good."

Suggestions by Seaborne

Charles R. Seaborne, vice president in charge of manufacturing at Thilmany Pulp & Paper Co., who was "loaned" to Longview Fibre Co. as consulting engineer when that Far Western mill was built, makes two suggestions for engineering effort.

"It seems that each company's engineering department might well investigate substitutes for scarce materials," he said.

"Another worthwhile project," said Mr. Seaborne, "is for engineers to investigate thoroughly the question of reclaiming by-products and turning them to good use within their own organization, substituting for materials that are practically unobtainable at the present time."

At Thilmany, for example, Mr. Seaborne said a chemical dust recovery project, which they are undertaking, together with utilization of sulfate soap or tall oil and turpentine, are expected to recover at the rate of $2 a ton of pulp this year. Two of the projects are functioning more than satisfactorily and the third is well on the way, he said. Later in this article we describe the chemical dust recovery pioneering project at that mill.

Randall of Champion Says "Heat" Is On Engineers

"This is the year of engineering emphasis," Herbert T. Randall, vice president and consulting engineer of The Champion Paper & Fibre Co. told PULP & PAPER Industry, when visited at his offices in Hamilton, O., "The heat is on the harrassed engineer to improvise and get some new piece of major equipment into operation, even with some vital part missing. This is also the year of disappointment in deliveries of equipment."

Mr. Randall mentioned a number of outstanding engineering advancements in different departments or



INDUSTRY LEADERS AND THEIR VIEWS ON ENGINEERING (left to right):

NORMAN W. WILSON, President, Hammermill Paper Co.: "Better quality, lower costs, etc., can only be achieved by continued and intelligent expenditures in research and engineering."

ERNST MAHLER, Executive Vice President of Kimberly-Clark: "Equipment has doubled or tripled in speed. Machine speeds range up to 2,500 feet per minute and machines widths are double that of early models."

JOHN E. ALEXANDER, President and Gen. Mgr., Nekoosa-Edwards Paper Co.: "Specialized engineering in this industry has become a must. The need for product development engineers is especially great."

J. W. HEMPHILL, Johns-Manville Co. and TAPPI Engineering Chairman: "Nothing could be more important than a study of power used in flow of paper mill fluids."

G. W. E. NICHOLSON, Vice Pres. (Manuf.) of Union Bag & Paper Corp.: "The industry has developed to a point where we must pay more attention to design, equipment and plant layout."

RALPH A. HAYWARD, President of KVP, says it is up to engineers to produce added productive capacity of employes to satisfy public demand and to prevent inflation.

different types of mills, but he emphasized that the "best brains" of the industry are needed right now in developing better forestry practices and mechanical equipment.

"It all depends on the viewpoint of the individual as to what he will consider the outstanding recent engineering advencements," said Mr. Randall, "If he is a pulp mill man, he will immediately think of hydraulic barking; new logging equipment, such as power felling saws and buckers; and loading equipment. He might also be thinking of ways to utilize the new Jonsson screen to advantage, or of changing his bleaching system to be in line with the latest practice.

"If he is a paper mill man, he will be thinking of electronic controlled paper machine drives, which are a big step forward. He may also be involved in the installation of a machine coating system, or one of the new high-speed head boxes and slices.

"If he is a converting mill man, he will undoubtedly be interested in the installation of a Hydrapulper, in order to cut his repulping costs.

"Coating mill engineers are, at the moment, concerned with new methods of color preparation; wider and faster coating machines, both as machine coaters and separate from the machine; and wider and faster supercalenders."

Mr. Randall predicted even greater paper machine speeds in the future and better printing qualities of paper.

Nicholson Views Advances

Gunnar W. E. Nicholson, vice president in charge of manufacturing for Union Bag & Paper Corp., performed a signal service for the entire industry and engineering advancement in particular by initiating the separate Fall Engineering Meetings of TAPPI during his term as president of that association (1946-47). Mr. Nicholson had this to say about engineering in the industry:

"As far as process is concerned, the industry has developed to the point where we must pay more attention to design, equipment and plant layout," he said. "Therefore, there has been a great increase in the number of engineers in the industry who are entirely occupied with engineering as such, and they are today playing a much greater role.

"Steam and electrical power generation has developed with particular success in this industry. It is for that reason that TAPPI during the past year has arranged special programs covering power, maintenance and construction and now has on its permanent schedule an annual devoted entirely to engineering.

"In the realm of engineering, too, is the status of usages of various materials and alloys in the building of equipment," said Mr. Nicholson. "Here engineering enters not only in the installation and operation, but also in the development of the equipment itself. We are paying increasing attention to techniques, such as the up-to-date application of modern tools to bring about lower labor costs, and the application of equipment for handling of materials by palletizing and conveyors; and the storage of material, as for example, silos for chemicals, engineering deserves the greatest attention in years to come and it is along engineering lines what most progress will come to this industry."

Alexander Stresses Importance

John E. Alexander, president and general manager of Nekoosa-Edwards Paper Co., of Nekoosa and Port Edwards, Wis., in an interview with PULP & PAPER Industry, stressed the point that engineering has become more important in step with increasing use and demand for paper.

"During the year 1947, people in the United States will consume approximately 18,000,000 tons of paper in its various forms," said Mr. Alexander. "This volume in itself presents tremendous problems to the design engineers in developing equipment large enough and fast enough to meet the requirements. An equally large burden has been placed on the power engineers to provide economically the basic thermal units and kilowatts to handle the load. Maintenance of all this equipment to keep it available 24 hours per day is an engineering job in itself.

"The thousands of new uses of paper, particularly those where it replaces other critical materials calls for distinctly new engineering techniques in the industry. Control of quality within narrower tolerances has faced the development and operation of instruments and equipment which do not influence production but which do help produce papers that will meet definite specifications.

"The need for product development engineers is great—engineers who can develop ways of producing papers which will do the jobs of the

metals, of wood, and to do jobs which other materials have never before done is now a definite part of the paper industry.

"Summed up, specialized engineering in the paper industry has become a must. In the old days a single engineer took care of the requirements in a mill. Now the design engineer, the power engineer, the maintenance engineer, the research engineer, the development engineer and the industrial engineer all have their place. Their need is continually increasing."

Need for Low Cost Salvage

Howard W. Morgan, manager, Pulp Division, Weyerhaeuser Timber Co., Longview, Wash., expressed his views to PULP & PAPER Industry regarding prospective engineering in the industry. He said he believes one of the most needed developments in the pulp industry, and he emphasizes the West Coast pulp industry in particular, "is the development of more efficient equipment for the recovery of waste logs and small trees that are not now brought in from the forests. Complete utilization of the available forest materials demands a lower cost for recovery and transportation to mills."

Also from the Willamette-Columbia river industrial area, is Carl E. Braun, vice president and mill manager of Hawley Pulp & Paper Co., Oregon City, Ore., who said "hydraulic barking is one of the most important advances in pulp and paper manufacturing during recent years." He sees considerable opportunity in the further conservation of wood through further use of the hydraulic barking system.

Pacific Coast Engineers Discuss Construction Advances

Justin H. McCarthy, chief engineer of the Kraft Pulp Division, Tacoma, Wash., of St. Regis Paper Co., whose 30 years in the industry include 17 with Hardy S. Ferguson,



Typifying engineering at K-C., as it is told about by Ernst Mahler, Executive Vice President, in the accompanying article, is this specially designed quarters.

Mr. Mahler told PULP & PAPER Industry: "An engineering department, after sufficient growth, should have its own central quarters. Last year, such separate quarters were made available at Kimberly-Clark. There are well-segregated divisions in our engineering department, so that specialization in different fields may be encouraged. The subsequent development of specialists has contributed in great measure to continuous improvement of machinery and process."

The open arrangement of these quarters, with few offices and few partitions, produces an atmosphere of departmental unity and cooperation and with a sound level so low that a first-time visitor is amazed to find upward of 170 persons at work in this one room. Conversations can scarcely be heard at a distance of 20 feet; lighting is uniform, averaging 45-foot candles at the drafting board level.

Most of the engineers work in this Monitor-type building used in wartime for the manufacture by Kimberly-Clark of gun mounts and artillery shell fuses. Following V-J Day the building was converted in 90 days to its present use.

The concrete floor was leveled and surfaced with asphalt tile. Walls were furred out, insulated and finished with wall board. A hanging ceiling was suspended from the Monitor construction at a height of 11'. The construction of the ceiling is unique; the facing is of acoustical Transite backed up by the company's own Kimsul insulation. The wood nailing strips supporting the transite are supported by 8" Stran Steel beams (the same light steel beams used in framing Quonset huts). The Stran Steel beams in turn are suspended from above by ½" hanger rods. The ceiling weighs less than 5 lbs. per square foot. For purposes of speed and economy, the entire ceiling was prefabricated in a fixture in panels 4' x 6' which were completed, including insulation and painting, before being raised into position between the steel beams. The Stran Steel beams were so spaced as to provide continuous troughs for lighting at 7' centers.

The lights are industrial type fluorescent fixtures suspended in the troughs above diffusing glass set flush with the acoustical ceiling. The entire department is well ventilated and air conditioned.

Office and filing room partitions are only 7½ ft. high, providing extreme flexibility since lighting, ventilation and sprinkler patterns in the ceiling need not be considered in office relocations. In the few offices where complete privacy is required, the gap between the partition and the ceiling is closed with clear glass.



HERBERT T. RANDALL (at right), Vice President and Consulting Engineer, Champion Paper & Fibre Co., Hamilton, O., indicated a number of examples of engineering advancement in an interview with PULP & PAPER INDUSTRY, which are reported in this article.

"This is the year of emphasis on engineering but it is also the year of disappointments in deliveries," he said, adding that the "heat" was on all engineers to improvise with incomplete equipment.

At left in picture above is WILLIAM CRONKHITE, of General Electric Co., one of the companies which have engaged in development of new sectional drives for paper machines permitting closer controls and higher speeds.

one of the deans of mill engineering, stressed the point that new materials and forms are available now for mill construction.

Mr. McCarthy was engineer in charge of recent construction of extensive new hydraulic barking and wood preparation plants at Soundview Pulp Co., which still stands as one of most complete modernization jobs of its kind on the continent. Interesting uses of steel and concrete to deal with big loads feature these "push button" wood plants.

"An engineer, faced with the selection of materials with which to house a new mill structure, should hesitate before adopting some form of construction because that particular form has been standard for such application for many years," said Mr. McCarthy.

"He should look about him and study new forms of enclosures which have been developed during the war years by industries who had no time to wait for slow and tedious brick and poured-in-place concrete construction, but rather had to find newer and faster-to-use materials to meet wartime production deadlines.

"Costs, and the certainty of getting the job done when required, together with probable maintenance on materials chosen, will affect the engineer's selection of important components of his structure.

"Prefabrication from precisely engineered layouts has brought the building industry many shortcuts to faster and more economical jobs. Timber and plywood, for instance, are being combined in many new ways with new and more dependable bonding agents recently introduced for their prefabrication."

Victor C. Haner, plant engineer, Puget Sound Pulp & Timber Co., where another ultra-modern wood preparation plant as well as a highly efficient and modern alcohol-from-waste liquor plant are recent additions, said that "pulp and paper mill buildings can be both efficient and pleasing in appearance at little extra cost."

He cited many departures from the old comparatively temporary wooden sawmill style of structure and mentioned uses of pre-cast concrete roof and floor slabs and brick tile and transite walls. The modern trend in equipment, said Mr. Haner, is for "finger-tip" or automatic controls on all process machinery.

He urged a bold attack upon "the sociological and economic aspects of labor saving devices in order to achieve greater management - labor harmony." It was a point that other mill managers and engineers who were interviewed stressed—that in the end labor itself is the greatest gainer as a result of engineering advancement.

Meder Johnson, who is now the chief engineer of Rayonier Incorporated, who headed up the machine shop war work of all the Rayonier mills on the Coast, noted that his company has had a great deal of experience with stainless steels up to the highest qualities. He said that the "use of moderately expensive stainless steel on certain parts in the wood room operations is economically feasible where wear is excessive."

He commented that "much wear blamed on abrasion is actually corrosion."

Another Pacific Coast engineer, J. H. G. Ellis, of Rayonier Incorporated, has predicted that higher qualities of stainless steels and alloys and other special metals will be developed to meet the increasingly critical corrosive problems being faced in the mills. The magnesia base and ammonia base sulfite cooking systems developed on the Pacific Coast are just two of the installations which have enhanced the importance of these problems, but both alkaline and sulfite mills are finding corrosion problems increased as they go to greater use of chemicals for higher quality products.

Mr. Ellis pointed out that stainless steel and other alloys have reduced maintenance costs and lost time in pulp mills.

Trend Toward Integration

Both Folke Becker, president of Rhinelander Paper Co., and Jack E. Maurer, vice president of Fernstrom Paper Mills, told our editors that an increasing integration of pulp and paper making has become a major trend of the industry as a whole, and that engineers are playing a big part in it. They both pointed to increasing costs of labor and materials as impelling forces in this movement.

Mr. Maurer, who heads up the expansion program of his Los Angeles company, said the mills which prosper in the future "will have to analyze costs more closely and make

greater use of engineering and technical aids such as controlled beating cycles, recording meters for almost everything, electronic controls, etc. We find greater emphasis being given to headbox, slice and formation area on the wire."

Mr. Maurer cited a big impetus for Yankee dryers, some of 100 lb. pressure, and speeds up to 2200 ft. per minute, and he named the Hydrapulper as a unit of great interest to non-integrated mills as a replacement for breaker beaters. He also mentioned the various new continuous refiners as important advances.

"Engineering skill is needed to modernize converting operations," said Mr. Maurer. "There has been no widespread improvement in cutting, packaging and counting operations for 20 years."

Machine Coating "Revolution"

In Chillicothe, Ohio, PULP & PAPER Industry talked about engineering with E. F. Bearce, vice president and production manager of Chillicothe Paper Co. and former chief engineer of The Mead Corp. From his rich background of engineering experience in both Canada and U. S., Mr. Bearce said the advancements presently being made in a matter of months are greater than those made in periods of several years in the past.

"Machine coating has revolutionized the book and magazine paper industry," said Mr. Bearce. "Paper machine and equipment manufacturers are working to closer tolerances due to more fineness of construction. There are increasing uses of anti-friction bearings and of up-to-date controls on speed, quality and production. There are many more applications for stainless steels and non-corrosive metals and better quality of metals are in demand. There is more attention being given to proper balancing of parts and units in processes."

Mr. Bearce, who has particularly been identified with electrical and power engineering in the industry, said that mills "must pay more attention to power as we are paying more for coal, freight costs and labor." He said spreader types of stokers give wider range of possible coals to use economically and that automatic controls are coming into greater use handling coal and operation of power plants.

Engineering at Blandin

Robin A. Campbell, back at Blandin Paper Co. in Grand Rapids, Minnesota, last year after three years in the Navy and now assistant general manager of that attractively and efficiently laid-out mill, made the point that "engineering, basically, makes possible a given process but, of even greater importance, is the further engineering that refines and improves processes, techniques and equipment to the end of making the process as competitive as possible from quality and cost standpoint."

This principle is illustrated at Blandin, Mr. Campbell said, "by our present construction and improvement program which includes better and faster wood yard and wood preparation equipment, improved stock preparation, more accurate and entirely automatic blending of the various furnish components, superior agitation and consistency controls, groundwood bleaching, improvements on the paper machines themselves, new supercalenders, and a completely revamped electric distribution system.

"These, in the aggregate, will not only improve quality with the same basic raw materials, but also through reducing variations, thus permitting average conditions to approach closer to maximum, and through reducing lost time by eliminating causes at the source, will result in increased production—and all this with no more men despite the addition of two new departments."

Mead's Gough Gives Views

In another interview by PULP & PAPER Industry, some interesting views on the possibilities for further advancement were discussed by J. B. Gough, British-born chief engineer for all mills of The Mead Corp.

"Handling of pulp logs from rail or truck to storage pile and from storage pile to digesters or to grinders is probably an outstanding item which should receive a much more careful and intensive study in most mills, and so as to produce the best economic balance between capital and operating costs," said Mr. Gough.

"The general and detailed layout of digesters and the handling of chips into them and apparatus for heat recovery and complete automatic control is probably a must in the next two or three years, although a few mills may have already gone this far," he said.

"I believe that a still more intensive study of flowbox and slice design, as well as the water extraction between breast roll and couch roll, is now imperative, especially on speeds from 1200 to 2000 feet per minute which are now in use, or are contemplated in the immediate future, and my personal belief is that even the very latest and best designs of flowbox and slice are the most important bottleneck to increased paper machine production. I also believe that improvement in



SYMPOSIUM ON ENGINEERING (left to right):

JACK E. MAURER, Vice Pres., Fernstrom Paper Mills: "It won't be long until even 100-lb. pressures on Yankee dryers will not be considered high. With talk of speeds of 2200 ft. now, what will speeds of 1960 be?"

RAYMOND F. BENNETT, Gen. Supt., Ecusta Paper Corp.: "Improved methods of stock refining is one of the most important engineering advances."

J. H. DAVIDSON, Chief Engineer, Minnesota & Ontario Paper Co.: "A bleach plant which may alternatively be used for groundwood and sulfite pulp is an interesting development and new controls and other features represent considerable advancement in engineering."

HENRY D. JOHNSTON, Assistant to Vice Pres. in Charge of Production, Strathmore Paper Co.: "Gains in paper machine speed which Strathmore can credit to Spencer dandy roll drive will average close to 20%. This cuts manufacturing cost correspondingly."

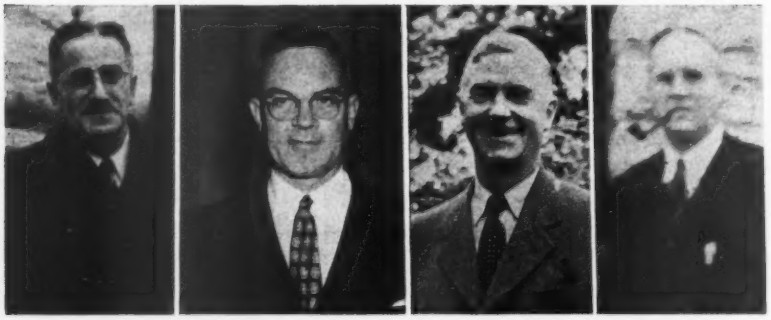


THEY ASSIST IN ENGINEERING ADVANCES (left to right):
A. W. ANTHONY, Jr., of Waltham, Mass., who developed equipment for successful pilot plant sodium fume recovery in kraft mill of Thilmany Pulp & Paper Co., described on these pages.

ALLEN C. HILL, Assistant Gen. Mgr., Gaspesia Sulphite Co., Chandler, Que.: "Reliability and continuity of operation were more important than initial cost in our power plant."
R. E. EYMER, Plant Engineer, Foster Paper Co., Utica, N. Y.: "We ran into some problems in installing stack dryers. Property limits prevented expanding any other direction, but we succeeded, increasing production over 20%."

A. E. MONTGOMERY, Western Mgr., J. O. Ross Eng. Corp., Chicago, and TAPPI Engineering Committeeman: "Drying is fundamentally a heat transfer problem and engineers should keep this in mind."

MEDER JOHNSON, Chief Engineer for all pulp operations of Rayonier Incorporated: "Use of moderately expensive stainless steel alloys in certain parts of sawmill (or woodroom) is economically feasible where wear is excessive. Much wear blamed on abrasion is actually corrosion."



SYMPOSIUM ON ENGINEERING (left to right):
HERMAN JOACHIM, Vice President and General Mgr. of Gibraltar Corrugated Paper Co., Inc., North Bergen, N. J.: "Steam savings are just in their infancy."

J. H. G. ELLIS, Engineer, Rayonier Incorporated: "Stainless steels and alloys have reduced maintenance and lost time."

DR. JOHN S. BATES, Canadian authority: "Greatest strides have been in wood preparation."

CHARLES R. SEABORNE, Vice President in Charge of Manufacture, Thilmany Pulp & Paper Co.: "Each company's engineering department might well investigate substitutes for scarce materials and reclaiming of by-products."



MORE VIEWS ON ENGINEERING (left to right):

VICTOR G. HANER, Plant Engineer, Puget Sound Pulp & Timber Co.: "Sociological aspects of labor-saving devices must be boldly attacked and solved to achieve complete capital-labor harmony."

MILTON JACOBS, TAPPI Engineering Committeeman and member of Chas. T. Main, Inc.: "These are years of application rather than development."

G. E. SUHS, Power and Electrical Engineer, The Sorg Paper Co.: "A major need in the power field of the industry today is to get cheap power."

J. N. FRANKLIN, Tech. Supt., Bowater's Newfoundland Mills: "Much depends on future perfection of science of measurements and automatic controls."

these items is going to be difficult.

"It appears almost certain that more extremely wide, heavy, expensive, and high speed supercalenders are going to be used and there is little doubt that this is going to be a challenge to the machinery designer, as well as to the operators in the mill," continued Mr. Gough. "As far as I know, a Wisconsin mill now has the largest with a 40" diameter by about 187" face forged alloy steel hardened and tempered bottom roll, and I hear that they have on order a still larger supercalender with a 48" diameter by about 215" face. Certainly these two sizes of supercalenders appear to be an important as well as interesting example of an advancement in engineering.

"Due mainly to the rapidly advancing cost of fuels, as well as of labor, the paper industry is at least making considerable improvement, in some mills, in the use of much higher pressure steam and extraction or topping turbines, until now pressures of 900 pounds steam are becoming fairly common in the more advanced mills and will become increasingly so in the future."

Heat and steam savings in this industry are still in their "infancy", according to Herman Joachim, vice president and general manager of the Gibraltar Corrugated Paper Co., of North Bergen, N. J., where he recently engineered construction of a new board mill in record time. One of the nation's outstanding paperboard plant engineers, Mr. Joachim, formerly of Los Angeles, also forecast greater integration of the industry.

"Most mills are using their present power capacities to the limit and many of them will need more power, which calls for engineering," he said. "Even though there is now a high percentage of heat and steam savings in some mills, the industry must achieve even more."

Marathon's Keeth Urges Savings

Along this line Grover Keeth, chief engineer of Marathon Corp., and former national president of the Superintendents Association, told PULP & PAPER Industry that he felt "it is high time we devote our effort to getting the most out of what we have, due to the tremendous increase in cost of labor, materials and supplies.

"Coal is costing us almost 50% more than it did before the war," said Mr. Keeth, "therefore I am starting a campaign to improve boiler efficiency and cut down on the use of steam.

"In one of our mills which formerly had an excellent power factor we suddenly found that this had dropped to a very low figure. After several weeks of investigation trying to find something that we had done we found that the power company had switched us to another transmission system, and that the voltage on the high side had increased almost 10% during light load periods.

"We have gone around plugging up holes, changing pipe sizes and perhaps changed the make of a trap because we thought another type would work better.

"With regard to maintenance, there was during the years of the war a constant high pressure rush to get out material with the result that coupled with the shortage of maintenance men, there is much to do along this line now."

Hemphill Urges Flow Study

"Nothing could be more important today in the pulp and paper industry than a study of the flow of paper mill fluids, the flow of stock in pipes," in the opinion of J. W. Hemphill, manager for the pulp and paper industry activities in the Johns-Manville Company, New York, and chairman of TAPPI's engineering committee as well as of the executive committee.

"Probably an average of 18% of the power used in a mill goes to shoving stock around," said Mr. Hemphill. "In some mills it may be as low as 14%, but it can rise to as high as 26%."

Yet, says Mr. Hemphill, we know very little about the coefficiencies of friction in pipes, and the what and why of losses. Certain things *are* known—that, for example, a reduction of 25% may be made in the size of pumps and lines in some mills; and that at certain velocities the friction curve appears to drop. But there has been almost no data gathered, and the information which is in existence is based on rather limited basic experimental data.

The job of gathering sufficient data, Mr. Hemphill believes, must be a cooperative one within the industry. Laboratory tests by individual manufacturers of pipe would mean little, in his opinion, because there would be too much change in both the characteristics of the pipe and stock after a number of experiments. Besides, laboratory experiments in this subject could not be applied to all types of pulp stock. And unless many mills cooperated, the cost of such a study would be prohibitive, Mr. Hemphill indicated. It is hoped, Mr. Hemphill told PULP & PAPER Industry, that at least a springboard into the subject will be furnished by means of a general paper and a discussion at the Engineers' meeting in Philadelphia this fall.

Jacobs' and Whitney's Views

1946 and 1947 are years of application rather than development in the opinion of Milton Jacobs, another TAPPI engineering committeeman and member of the firm of Chas. T. Main, Inc., Boston. "In other words," says Mr. Jacobs, "the machinery and structures which we have today are for the main part a maturing of previously known developments. Therefore, the emphasis is almost entirely on application."

Mr. Jacobs believes that the following are some of the important engineering applications made or being made within recent years: Hydraulic barking on the West Coast; multiple knife chippers; higher pressures and temperatures in boilers; cabinet type of electrical load centers; multiple generator MG sets for paper machine drives; higher speeds on paper machines; high speed wide super calenders to take paper the full width of the paper machine; coating on the machine; coating preparation; handling of coating materials; groundwood bleaching; continuous grinders; single blow pit with water blow and vacuum washing; improved arrangement of the flat screening system; new type knotter screens; pre-fabricated piping; and transite piping.

"There has been a distinct change in the ratio of cost of structures to cost of equipment," said Mr. Jacobs, "demanding better building design and arrangement to increase productivity per square foot of building and take full advantage of improved engineering in the equipment. The things I have outlined to you are a reflection of an improved operating know-how and technique within the industry and a high standard of design and workmanship by equipment manufacturers."

Roy P. Whitney, another member of TAPPI's engineering committee and director of the department of industrial cooperation, University of Maine, said that one of the most important engineering advances is in "the development of the new recirculatory sulfite cooking processes in which the waste liquor is removed from the pulp by counter-current washing and then processed to remove chemicals or valuable by-products. This includes the substitution for lime of such bases as soda, magnesia, or ammonia."

Comment by Suhs of Sorg

"The major need in the power field of the pulp and paper industry today is to get cheap power, because of the big demand for steam in the papermaking process," commented G. H. Suhs, who got his training as electrical engineer in Wisconsin River Valley, where some of the greatest power development of this industry has been created. He is now power and electrical engineer for the Sorg mills in Middletown, O.

"It is now frequently entirely possible for a paper mill to get all the process power it requires as a by-product from its turbines if it installs high pressure boilers," he said. He mentioned one paper plant —not his own—where a change from low to high pressure boilers saved the company $400,000 a year. (Later in this article a new boiler installation at Sorg is described.)

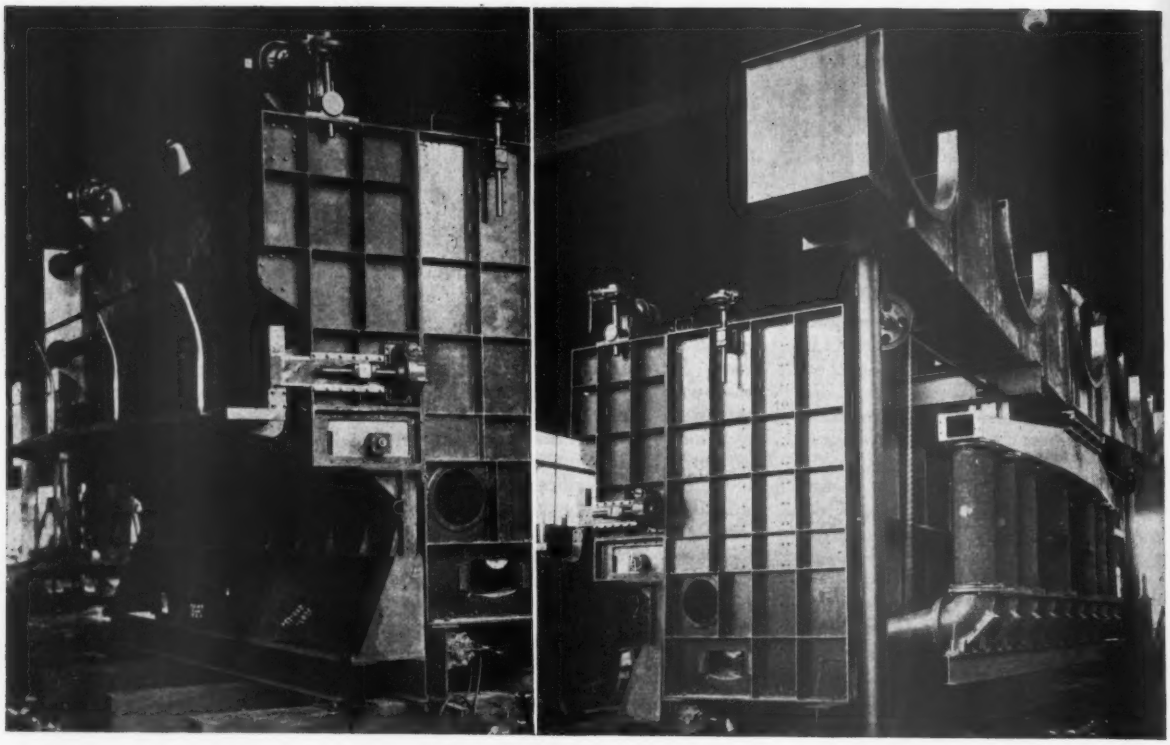
Speaking of new central operating control boards for various departments in mills—a trend which is rapidly spreading throughout the industry—Mr. Suhs cautioned that it is not enough just to put these push-button systems in power plants, pulp preparation rooms, log barking plants, digester houses, etc.

"The important thing is to have adequately trained men available to operate a central control system," he said. "You've got to have an operator who knows all about what's going on behind the panel — who knows when operating conditions are right or wrong."

He said engineers must design boilers for this industry which can burn all grades of coal, because the day is apparently fast approaching when high prices of better grades and plentiful supply of lower grades will make it more economical to use the latter. If a mill tries to use poor grades in a boiler designed for high grade coal, it reduces capacity, forces shutdowns by slagging boilers and furnaces and increasing maintenance."

Pringle on Maintenance

George H. Pringle, graduate of Canada's McGill U.; chief engineer Chillicothe div., Mead Corp. and chairman of TAPPI's maintenance and material committee, was called upon by this magazine in his Chillicothe, O., offices. He warned that the industry is going to be faced with a great influx of college-trained ex-G.-I.'s seeking engineering positions and that it's up to the in-



HERE ARE TWO VIEWS OF NEW HEADBOX equipment for new Pusey & Jones 245-inch fine paper machine which went into operation at Champion's Canton, N. C., mill in January. Vice President Randall said the headbox and slice equipment was "a superintendent's delight" because of its versatility and that he could do almost anything with in on a Sunday shutdown. A discussion of this equipment is carried in this article.

dustry to make maintenance jobs attractive to these young men.

"For ten to 15 years, comparatively few trained engineering graduates have been coming along," he said. "When the influx starts, it seems a good idea to initiate them in the drafting room, for a year, so they can learn departments and supervisors and the company can size up their special talents before assigning them. We should go slow in assigning them to maintenance or operations. But then we have got to make helpers and maintenance jobs attractive to them and try to cooperate with unions to clear up complications that might be in the way of their advancement."

George Charters, assistant resident manager of Crown Zellerbach Corp., Camas, Wash., was praised by Mr. Pringle and others in the TAPPI engineering committee as having laid out the best fully-detailed mill maintenance program any of them had yet seen or heard about. It is too extensive to discuss here, and the "Charters plan," they said, would take some time to put into effect with adequate manpower and training.

In line with Mr. Pringle's theme, Abitibi Power & Paper Co., Ltd. has inaugurated a special three-months course for young engineers to give them the benefit of knowledge gained by older members of the industry. President D. W. Ambridge of Abitibi felt that a gap had been caused in the engineering ranks of the industry as a result of the war and the years of depression which preceded it. This gap brought about a scarcity of technically trained young men with from six to ten years' practical experience in pulp and paper engineering.

Under direction of Ben Cowan of the firm of E. B. Cowan of Montreal, the school is established at Abitibi's Sault Ste Marie mill. A group of men between 20 and 30 years of age was selected, 70% being veterans of World War II.

Maintenance of Drives

"Progessive management recognizes that the productive capacity of a paper machine is affected to a large degree by the reliability of its drives and the caliber of its preventive maintenance program," says John N. Tuttle, chief engineer for the Valley Forge and McDowell divisions of the Westfield River Paper Co. of Russell, Mass. In this connection, Mr. Tuttle has this to say:

"A good inspection program is of the most importance with electric drives. If properly carried out it will mean that the same dependable service expected from electric motors will be received. There will be no large repair jobs. Electric drives on our paper machines have a fine record of dependability. The sectional drive on No. 3 machine was installed in 1933. In 1946 its availability was 99.9115%, based on time loss due to electric drive trouble. The preventive maintenance and repair time—155 man hours.

"The record of our single motor drives is even better than the sectional drive," Mr. Tuttle told PULP & PAPER, "but this is offset by time lost in repairing clutches, belts and other mechanical equipment between motors and machine. In the 13 years of operation it has not been necessary to replace a worn commutator or to rewind a motor. To my mind, a good preventive program consists of the following: 1. Regular *daily* inspections of major drive units to prevent the development of any commutation trouble; 2. Weekly checks on contacts and relays; 3. Daily meter readings which indicate the development of any mechanical difficulty in dryer bearings, presses, etc. Our motors are equipped with anti-friction bearings and require lubrication monthly. Gear units are enclosed in oil and need only to be

changed annually. We take monthly insulation readings on all units and controls. A small stock of contacts and operating coils is on hand for quick change if necessary."

Mr. Tuttle added: "We find the electric drive outstanding from a safety standpoint, too, and we like the range of speed and flexibility and the ease of control. But the more successful your preventive program is the more time will be available for plant modernization and other construction work. The maintenance department can, to a large degree, be made *productive*."

Attention to Handling

"I feel certain that the pulp and paper industry will be giving a lot more attention to the mechanics of materials handling from now on," R. I. Wynne-Roberts, chief engineer, Finch, Pruyn & Co., Inc., Glens Falls, N. Y., told PULP & PAPER Industry. "There is much to be done in the way of expediting the receipt and handling of raw materials, as well as in the handling and packaging of the finished product. During the past several years new kinds of raw materials have been introduced, and new products developed, without a real corresponding improvement in their handling. Surely materials handling is going to undergo considerable improvement and modification on the part of many mills."

A Southern View

Raymond F. Bennett, general superintendent of the skillfully engineered and ultra-controlled Ecusta Paper Corp. plant in North Carolina, and first vice president of the Superintendents Association who will head up their big New Orleans meeting next year, told an editor who visited him that he regarded improved methods of stock refining as one of the most important engineering advances.

"While the bulk of the paper produced is still being made with beaters and slow speed jordans," said Mr. Bennett, "more and more stock refining equipment manufacturers are producing or doing development work on smaller high speed equipment. This equipment produces stock of equal quality with a considerable saving in power and in many cases, labor.

"Tremendous amounts of money are being spent by the industry for power to operate refining equipment but there is still too much sloshing of the stock without accomplishing anything in the way of refining. The equipment manufacturers are doing a good job in development and educational work leading to the elimination of this and they should be given a pat on the back for it."

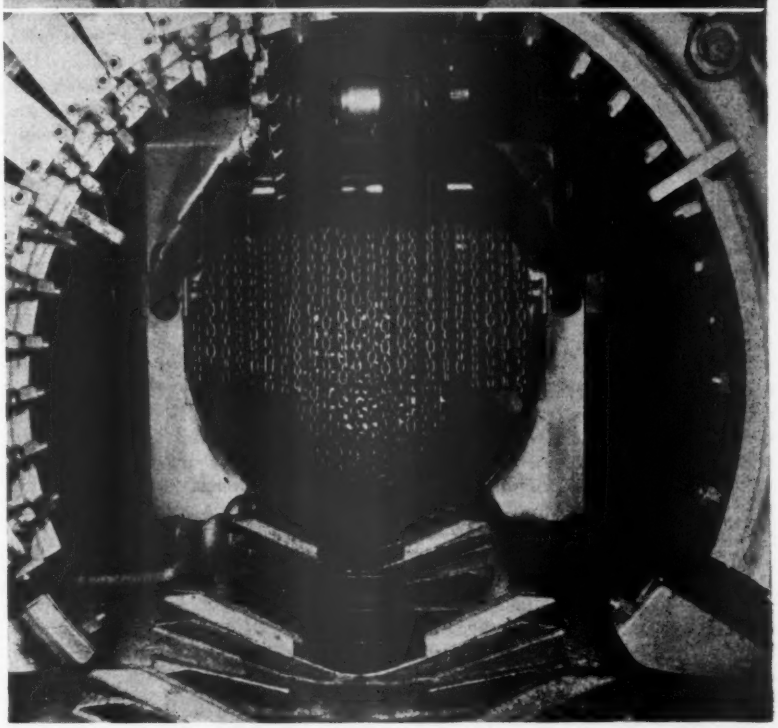
Canadian Views

Dr. John S. Bates, of Price & Pierce, Ltd., Montreal, one of the foremost authorities on the industry's technology, expresses the opinion that during the past year or so the greatest strides have been taken in wood preparation; that this particular field has developed not only more radical departures from conventional practise but the most pos-

HYDRAULIC WHOLE LOG barking effecting up to 20% wood saving in conjunction with whole log chipping is rated by many engineers as one of the industry's all-time greatest advancements. Above is the "lathe type" hydraulic barker developed at Crown Zellerbach mill in Port Townsend, Wash., and installed now in several other mills. This particular machine is at Rayonier's Port Angeles mill.

Below, the adjustable ring type barker at Soundview Pulp Co., which is built for high capacity production—logs pass through butt to butt and nozzle segments shown are adjustable to log diameters of 9 to 60 inches. The huge Sumner Iron Works concave rolls in foreground of picture weigh a ton to one and one-half tons each.





itive means of curtailing long-term costs and utilizing raw material.

On the other hand J. N. Franklin, technical superintendent of Bowater's Newfoundland Pulp and Paper Mills at Corner Brook, one of the world's greatest newsprint producers, says the main engineering contribution to the actual science of paper making revolves around the design of equipment for agitation and particular blending of stock in the largest possible quantities, and he points out that there have been some major developments by the manufacturers of propeller-type equipment in the last few years.

"The science of measurement in the paper industry and its function in automatic control has been severely handicapped by the inability to measure continuously such functions as consistency, freeness and percentage of stock composition," said Mr. Franklin, who added: "These two subjects are very closely related and on them depends the future ability to produce the uniform quality of newsprint paper which is so desirable from the publisher's point of view."

The manager of one of the largest mills in the Consolidated Paper Corporation group writes: "Probably the greatest development in paper mills has been in increased speeds and machines have operated on news at 1700 f.p.m." Actually, Powell River Co's new machine, which will be the most modern in Canada and the only installation of its kind in some time, will operate at 1,600 f.p.m. when first installed, but engineers of Dominion Engineering Co. at Lachine, Que., are designing it for an ultimate speed of 2,000 feet.

The Consolidated executive continues: "Improvements in groundwood quality have allowed for improved printing and, at the same time, a reduction in chemical pulp content. Higher vacuums are being used on the couches and presses, and in the case of the couches double boxes are being used extensively at speeds over 1200 feet.

"A great improvement has been made in dryers by improved pressing, allowing the sheet to enter the dryers at a reduced moisture content. Dryer enclosures have also been improved to cut down the excess air and raise the exhaust temperature."

SOME RECENT EXAMPLES OF MODERN ENGINEERING

Even in this North American Review Number, there is not the space to discuss in detail all the interesting engineering developments of the industry, but our editors, in their travels, have gathered information on quite a number of important examples.

We have gathered some photographs and drawings to illustrate these examples and they are shown on preceding pages as well as the pages to follow. In some cases, the story is adequately told in the picture itself with its descriptive caption.

PAPER MILL ENGINEERING

In the paper mills, the paper machine itself is the center of engineering interest and development. With its capacities, everything else is coordinated. In the preceding symposium of views on engineering, a great deal already has been said of advancement in attaining higher speeds on machines with greater width and more precise controls.

Almost unheard of tonnages from a single machine—up to 650 tons in a 24-hour day—are going to be produced in the next year or so. Power going into Nash vacuum pumps used on paper machines is heading up toward 1500 hp because of the high speeds and necessity of quicker drying.

A single control board for a machine tender which would not only be a central point of operation for the machine but for preparation equipment ahead of it, also, is possibly not too far away. Deaereation of paper stock and faster hydration are problems on which engineers, we learned, are likely to produce some startling innovations and soon.

One of the widely discussed new machines is an all-purpose board and paper machine with a wide range of basic weights and speeds and featured by Beloit's two suction couches. A primary suction couch is located just after suction boxes and at the position often occupied by the guide roll. This dual couch arrangement is credited with sending a dryer sheet to the press, an important economy, and insures safer operation. As is now well known, the first of these machines went into the big Georgetown mill in the South, and others are due for delivery to West Virginia Pulp & Paper Co. in Charleston, S. C., North Carolina Pulp & Paper Co., Plymouth, N. C., and Crown Zellerbach's Camas, Wash., mill.

An alternative idea is a dual box in the same couch in several newsprint machines in Canada.

Headboxes and Slices

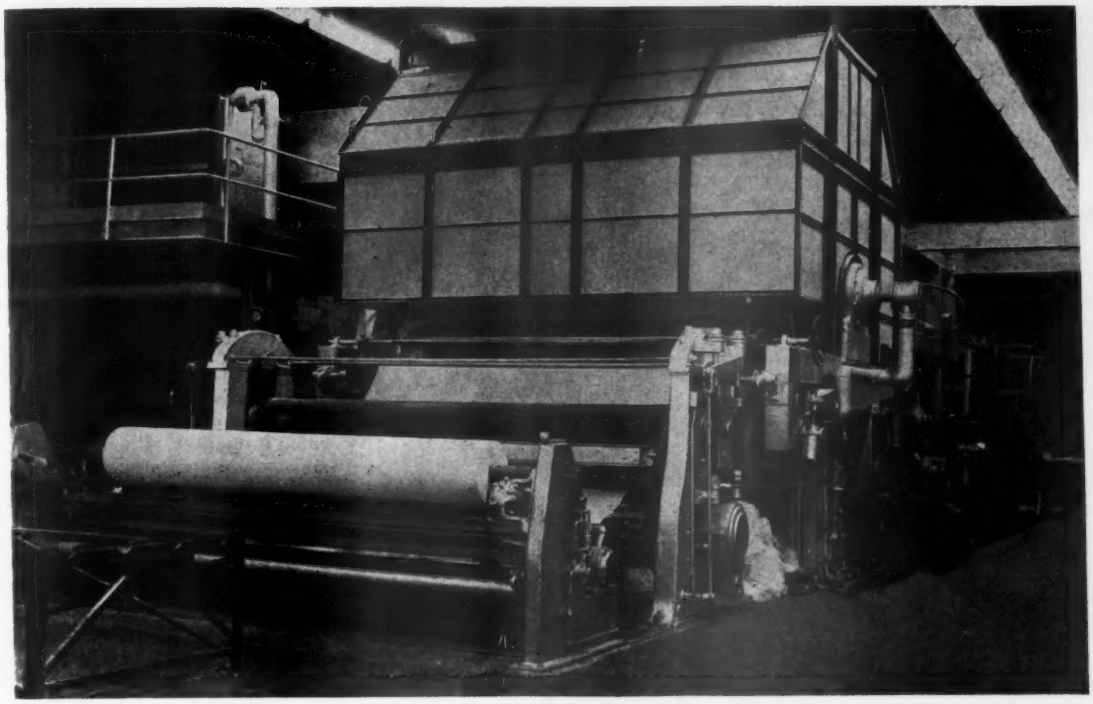
K. O. Elderkin, manager of the Crossett Paper Mill Division of Crossett Industries, Crossett, Ark., has installed a closed headbox with pressure inlet of his own design on the Bagley & Sewall high speed kraft machine at that mill which operates 16000 f.p.m. on 40 lb. stock. This was the first pressure inlet in the South and when observed in operation by PULP & PAPER was being improved upon by Mr. Elderkin, whose background was engineering at McGill and newsprint in Canada.

Headboxes made of cypress lumber and Monel lined were mentioned by Chief Engineer George Pringle of Mead as one of types that stand up well. The lining gives a good, clean surface inside, making it easy to clean out the headbox. Light guage Monel, about 20 guage, is satisfactory. Welding of joints is possible. Copper had been found brittle, breaking away at seams.

A Johns Manville Chemstone headbox for Thilmany Pulp & Paper Co.'s No. 8 machine was observed by one of our editors as a rather recent installation. Smooth and easy to clean because it is compact, it has no square edges or pockets. It has wax-treated inside surfaces. These cleaning aids make it possible to run a great many colors with fast washouts when changes are desired.

Some engineering ideas developed by F. W. "Stub" Johnson, operating manager and chief engineer at Rhinelander Paper Co., Rhinelander, Wis., for improved stock entrance on the "Big Swede" and other machines at that glassine and greaseproof paper mill are embodied in headboxes used there. Variations in range of volume put on the wire and range of freeness and stock characteristics called for inlet-headbox design that would telescope on itself in two dimensions.

This Big Swede machine (Beloit), widest and fastest ever used for glassine, was described in PULP & PAPER in a special article which stressed the point that handling and



ONE OF THE FIRST POSTWAR MACHINES—two of these identical machines now operate side by side at the excellently engineered and ultra-modern new Personal Products Corp. mill at Milltown, N. J. This is a Bagley & Sewall 142-inch Fourdrinier with high pressure Pusey & Jones dryers. One of the interesting new parts on this machine is the high speed suction press units engineered by Downingtown Manufacturing Co. and built by that company. This machine unofficially will do considerably over 1,000 ft. per min.

direction of stock to wire from the Bird screens and Centrifiners, which team up to trap dirt, was a critical step.

C. Meyers, board mill manager at the Antioch, Calif, mill of Fibreboard Products Inc., told PULP & PAPER that a Black-Clawson Co. hydronamic inlet installed on the Black-Clawson vat of No. 2 cylinder machine there has greatly improved uniform flow and performance, practically eliminating mottle effect and permitting handling of longer fibers.

New Headbox and Slice At Canton, N. C., Mill

There are many new interesting features on the new No. 11 Pusey & Jones 245-inch fine paper machine which went into production at The Champion Paper & Fibre Co. mill in Canton, N. C., on Jan. 31. It has a new steel Neoprene-lined headbox and stainless steel slice which are so versatile in operation that Herbert T. Randall, vice president and consulting engineer for all Champion mills, called this equipment "a superintendent's delight."

His point was that a superintendent could change the operation almost anyway he wished on a short Sunday shutdown. It is illustrated in a picture on page 42.

"The breast roll is adjustable both forward and back, while the new No. 11 machine is running," he said. "The slice itself can be used at any angle. The headbox is designed for 1300 ft. per minute, but the sides could be extended to make it good for 1500."

Stock delivery to the machine is through five Bird screens discharging into a common trough or screen hopper, designed so the stock will flow at the same speed from the ends to a common discharge in the bottom at the centerline of the machine, then to a distributing header similar to the screen trough but entirely enclosed and turned upside down, carefully designed for steady flow of the stock.

Between the screen trough and distributing header is a flat slide valve opening from the center in both directions. The purpose of this valve is to maintain a level in the screen hopper so there will be no cascading from the screens and entraining of air regardless of the head of stock in the head box.

Leading from the distributing header to the head box are as many discharge pipes as can be conveniently arranged to deliver the stock as evenly as possible across the machine.

Instead of the usual steel pipes and gate valves, the discharges are rubber hoses that have a device for "pinching" the flow if any regulation be desired. With this method there are no abrupt restrictions such as are encountered with the standard gate valve. At the end of these hoses are flaring adaptors connected to the head box to further spread the stock as much as possible.

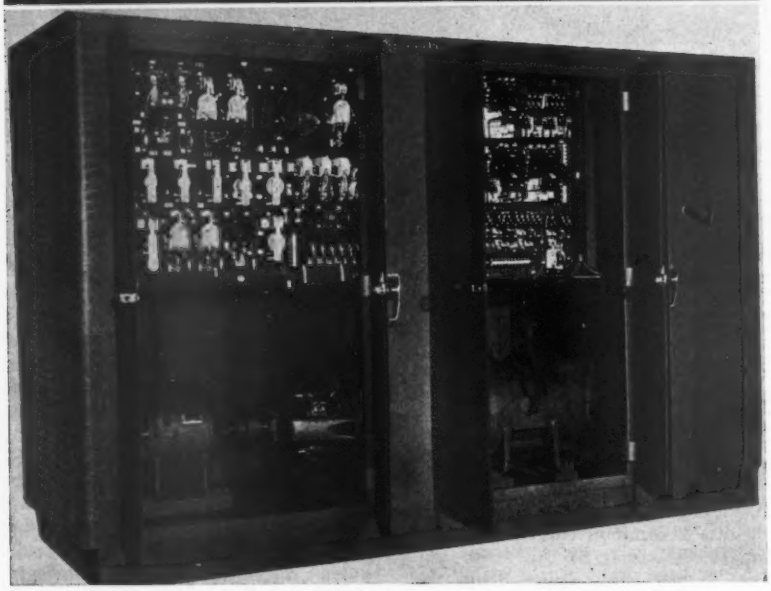
The head box has one and one-half passes or three compartments with perforated baffle plates and rolls, also an adjustable baffle. The usual quick-dumping valves, manholes and handholes to facilitate cleaning and repairing are provided.

Dandy Roll Drives at Strathmore

Strathmore Paper Co., after successful development of a sensitive electric drive for dandy rolls in collaboration with John Spencer, engineer, now reports that these drives can be credited with 10% to 30% increase in paper machine speeds while retaining improvement in watermarking.

Henry D. Johnston, assistant to the vice president in charge of production, said Strathmore has ordered these drives from Sandy Hill Iron & Brass Works for all of their Fourdriniers, and they "have been able





ONE OF THE FEW INSTALLATIONS IN THE NORTH AMERICAN industry of this kind, top view is a hookup at Fernstrom Paper Mills, Pomona, Calif., of a 250-hp Terry steam turbine in direct drive for a Yankee machine, with double reduction Western Gear Works 30 to 1 gear. Substitutes 4 tons of equipment for 12 tons.

Below is an interior view of a Reliance Electric & Engineering Co. V-S "Packaged" self-contained unit for adjustable speed drives in mills. A Kimberly-Clark representative reported that packaged type units of this type have been demonstrated as being more economic than the common M-G system.

to produce a clear watermark far ahead of any expectation."

They have been put on machines of 350 to 400 feet speed so far, but will go on a machine of 800-900 feet per minute speed and are adaptable for plain woven papers as well as paper with watermark.

Sandy Hill is also making a drive for a trunion dandy as well as a spindle dandy.

In the field of electrical control, electrical drives have been developed for Canadian machines which provide a much finer draw adjustment than was previously available. Some of these use electronic controls. An improvement has been made in starting mechanism and switch gear by the use of cubicle type of panel. It is believed that most modern transformer installations are of the air-cooled type and considerable excess capacity can be taken care of by the addition of fans for cooling purposes.

Coating and Calendering

High speed on-the-machine coating of paper is perhaps the most significant engineering development as far as the paper machine itself is concerned in the industry, from the standpoint of its expansion in the past year or so. As a process, it is over ten years old, but the immense increase in slick paper magazine circulation with its demand for mass production of coated paper has brought many new installations. Crown Zellerbach's West Linn mill will be producing this paper in July, presumably; an installation is being made at International's Palmer, N. Y., mill and there are several others. Coating rolls, which operate like a printing press, are located between wet and dry end of the machines.

Complementing this is the great expansion and speed increase of supercalendering. Appleton Machine Co. has produced super calenders operating up to 1800 feet per minute, an engineering achievement made possible by superior bearings and a shift from castiron to welded steel frames for the calender rolls.

Virtually every book and magazine mill in U. S. and Canada has or will put in high speed coating and super-calenders.

New Yankee Direct Drive

An outstanding power hookup of direct drive of a 250-hp. Terry steam turbine, with double reduction, 30:1, has been made on the No. 1 Yankee dryer at Fernstrom Paper Mills, Pomona, Calif. The herringbone reduction, with two sets of gears to make up the complete ratio, was designed and built by Western Gear Works.

Said to be the only installation so hooked up with a steam turbine in a paper mill, officials say it is proving the simplest way possible to operate a Yankee machine, with no unnecessary gears, belts and pulleys, and no angle bevel gears to give possible maintenance trouble.

As a result of the installation, it was possible to eliminate nine pulleys and mechanical transmission equipment weighing 12 tons, using instead two pulleys and shafting and beams scaling four tons; or a total reduction of eight tons of iron and steel.

Spot Conversion Drives

"Spot conversion" or self-contained package units for adjustable speed drives in pulp and paper mills are becoming of increasing interest and being more widely used, as a result of demonstrated economies over the common motor generator system.

Richard R. Nelson, process engineer of Kimberly-Clark Corp., and two engineers of The Reliance Electrical & Engineering Co. of Cleveland, made a timely report on spot conversion drive for adjustable speed and on the economies of these set-ups in talks given before TAPPI recently. Reliance is a manufacturer of these packaged units.

Speaking from his experience, the Kimberly-Clark engineer said the packaged units, one of which is illustrated in a photograph on these pages, shows up its advantages on four bases — (1) initial cost; (2) flexibility of re-use; (3) maintenance cost and (4) operating performance. He cited selection of the packaged units for a concentrated area to serve a kraft mill with bleachery and pulp washing in close proximity. For comparable installations in this case he said the common M-G system installation cost with spares would total $25,430 for material and $6,515 for labor (figures from large private electrical installer and current material price quotations) whereas the installation cost of the V-S packaged system, including overhead and supervision costs, figured only $19,375 for material and $6,215 for labor.

He said a second decision in the same mill in favor of the packaged units was in the case of a variable speed drive for screw conveyor discharging chips from a chip bin. Logical location for M-G set, in this case, would have been 600 feet away. All factors mentioned favored the packaged unit for two vacuum thickeners, too.

Mr. Nelson mentioned also useful electronic spot conversion variable speed drives as favored for a Roberts grinder feed mechanism and other uses.

Dirt-proof and splash-proof motors are being made for the industry, a large one for The Flintkote Co. in Los Angeles being an example.

How Foster Paper Co. Increased Its Drying Capacity

To increase production in board mills, especially, drying is usually the bottleneck. For a small mill with limited possibilities, Foster Paper Co., Utica, N. Y., showed ingenuity in engineering a 20% production increase (capacity was listed at 50 tons on bottle cap, paper can stock and board of .025 to .060 calipers). Foster had a 7-cylinder machine with 72 dryers (36-in.) in triple deck frames, trimming 66 inches.

"We had a good dryer drainage system and a Ross vapor absorption system," R. E. Eymer, plant engineer, told PULP & PAPER Industry. "Not much could be done to existing equipment. We were built to limits of our property so it was not possible to build on either end of the machine room. This left us only one alternative: To stack the dryers. Our first thought was to increase the heighth of the machine room but possibility of procuring necessary building materials was discouraging. However, we found that by making some structural changes in our roof trusses we would have room to install our dryers in stack frames five high.

"We found a stack of 20 dryers suitable for our machine which we completely reconditioned and balanced."

The truss changes were made on regular week-end shut-downs and did not necessitate any lost time on this part of the operation. During vacation shut-down, 22 of the triple deck dryers and frames were taken out and the new stack of 20 dryers was installed. Old dryers were completely reconditioned, balanced and fitted with rope carrier sheaves before installing in the stack frames. Old gears were replaced with new cut tooth gears. The remaining two stacks were erected on Sunday shut-downs.

The ladders front and back, were made in Foster's shop from angles and one-inch pipe welded together. Ladders constructed in this manner were very satisfactory and easily set-up and anchored.

"We ran into some problems when we installed the rope carriers on our old dryers in stack frames as the clearance between the end of the dryers and inside of the frames was so small as to make it difficult to find clearance for the return rope," said Mr. Eymer.

"As our dryer section now stands we have 20 dryers in the first stack, 22 dryers in the second stack, 20 dryers in the third stack and 30 dryers in triple deck frames making a total of 92-36" diameter dryers. On the stack dryers we installed a conventional vapor absorption system, the triple deck dryers already being so equipped."

Increased drying capacity and addition of vat and cylinder making a total of 8 cylinders increased production over 20%. The Foster mill anticipates an average 30% increase after further refinements and 40% increase on peak days.

POWER PLANT ENGINEERING

Engineering advancement in the industry is no more strikingly demonstrated than in the new and efficient power plants and recovery systems which are being installed in the mills.

With the extensive expansion going on, mills are finding their power facilities inadequate and even antiquated. Automatic, push-button controls; reduced maintenance, with use of superior materials; heat saving and better heat use; elimination of laborious, hand-handling of fuel—and, above all, facilities for cheaper power—these have been the principal engineering objectives achieved in the new plants that are going up.

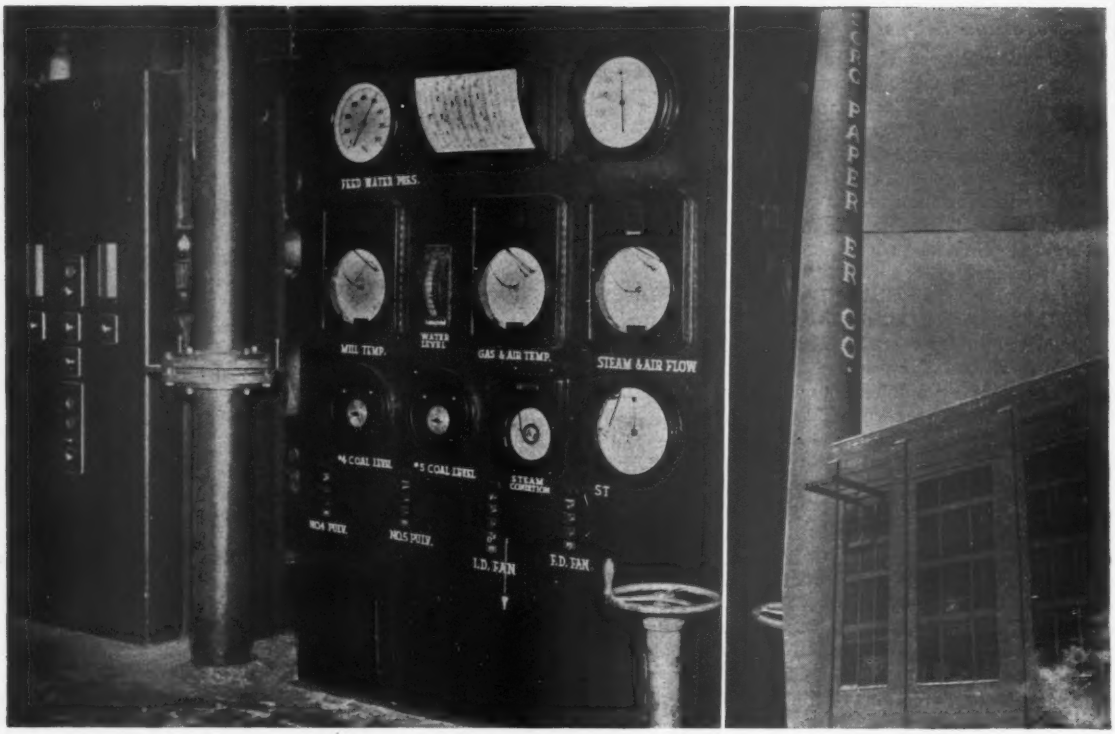
At The Sorg Paper Company

Perhaps the most recent, or one of the most recent, as of this date, is the new and modern Babcock & Wilcox integral unit, producing 120,000 lbs. per hour of steam at 425 lbs. pressure, at The Sorg Paper Co., Middletown, O. It was just a short time ago that the first fire was started in this new plant and on the very next day a PULP & PAPER Industry editor was present to see it in operation.

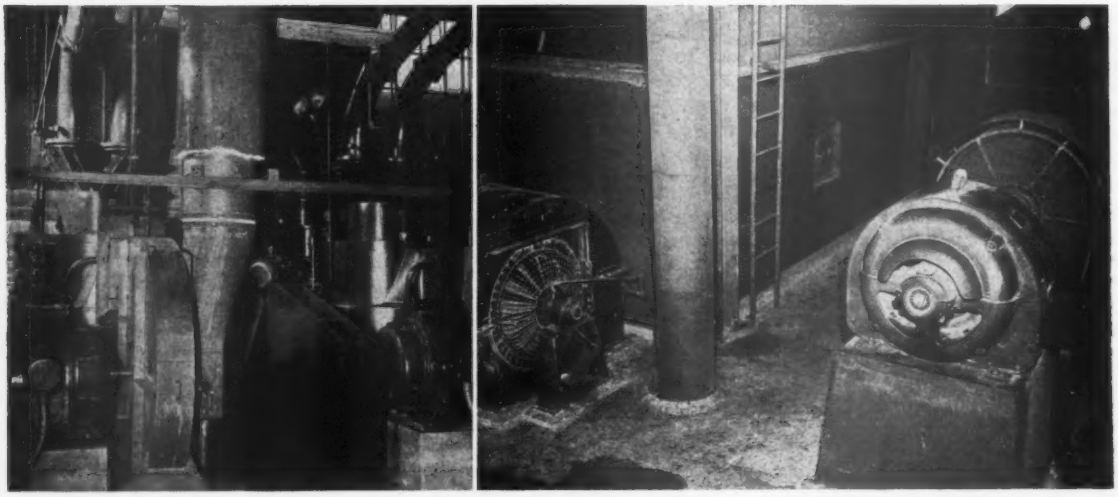
The original power plant at Sorg was built in 1929 and designed for burning only 70 tons of coal per day. Now requirements to 240 tons per day and the economies achieved are to be of commensurate importance. Three boilers are each rated at 50,000 lbs. max. per hour will continue to operate The additional boiler insures a spare unit at all times. Previous mill improvements had brought Sorg's production of urgently required wartime paper to 70,000 tons a year from pre-war output of about 30 to 35,000 tons. With added steam now available, a further increase may be anticipated.

Various new operating methods and controls in the new plant will result in substantial improvements in operating efficiency, D. G. Driscoll, president of the company, told PULP & PAPER Industry.

Full automatic combustion con-



At Left—CONTROL AND INSTRUMENT PANELS for new No. 4 Boiler at The Sorg Paper Co., Middletown, O. The accompanying article describes new controls and economies put into effect in modern power plant at that group of mills. At right—an exterior view of the new power plant taken by PULP & PAPER Industry.



A Left—Pulverizers for new No. 4 Boiler at The Sorg Paper Co., part of integral unit supplied by Babcock & Wilcox Co. At right: Forced and induced fans at The Sorg Paper Co. Back of Westinghouse motor at right is Electric Machinery Manuf. Co. magnetic adjustable speed drive, which makes possible better control of air in operation of induced draft fan.

trol puts the entire control of all units of this power plant under one operator at one station. The new plant is about 60 feet in heighth from basement to top floor—the stack is 200 feet high—and this makes the idea of a single control board even more impressive to the visitor at this plant. The Westinghouse control panel is shown in an illustration accompanying this article. Although one man could operate the entire plant, Sorg, as a safety precaution, will always have at least two men on different floors.

The boiler is fired by powdered coal and other integral parts of the B & W equipment are pulverizers, an air preheater and two fans.

Another new gadget for automatic and more exact control is an Electric Machinery Manuf. Co. MD-1 magnetic adjustable speed drive, also shown in an accompanying picture, which controls operation of the induced draft fan. The magnetic drive is a compact, self-contained, self-cooling unit mounted between a Westinghouse motor and the fan and achieves a closer control of air.

Other automatic equipment is a Link-Belt coal handling system,

delivering coal to Richardson automatic scales at each of Sorg's boilers. Coal is unloaded from cars to a storage bunker. Sorg has 400 tons active storage, available for delivery. The automatic delivery leaves the operating man free to care for his equipment. Under the old system, coal was carried by controlled lorrycar to each boiler.

Two 6,250 KWA turbines have been overhauled at Sorg as part of power plant modernization. All piping has been supplied by Midwest Piping & Supply Co. of St. Louis.

Recognizing the need for very careful water treatment in high pressure boilers from both the standpoint of boiler and turbine operation, The Sorg Paper Co. has installed one of the first of the new two-stage Infilco hot process water softening systems. This is comprised of a hot process lime soda stage followed by a phosphoric acid stage. Here, again, is a system that allows for greater economies and better control. No chemicals are added to the boiler, as in the past, but all chemicals are added externally and sludge in the boiler is eliminated.

"In this plant we are getting 60% to 70% of the required electrical power by passing the high pressure process steam through the turbines." said G. H. Suhs, power and electrical engineer of The Sorg Paper Co.

Dr. Allen C. Hill, assistant general manager of the Chandler mill in Quebec of the Gaspesia Sulphite Co., said their one-year old high pressure power plant is one of the most modern and efficient. Reliability and low maintenance were more important for this distant mill than first cost.

Two pulverized fired boilers rated at 65,000 lbs. per hour at 600 psi and 710 degrees final steam temp. supply a 4,000 kw double extraction condensing turbine. Operation is fully automatic under the Hagen system of control. Panel board has two Reliance Eye high guages for observing water level. Water level is regulated by a Copes Flowmatic and there are automatic controls on reducing and de-superheating stations set to cut in when pressure drops and for use on startups and when mill steam demand exceeds power steam required.

Among modern new power plants in the industry one at Chillicothe Paper Co. was described in the May issue of this magazine and it offered advantages similar to the one at Sorg.

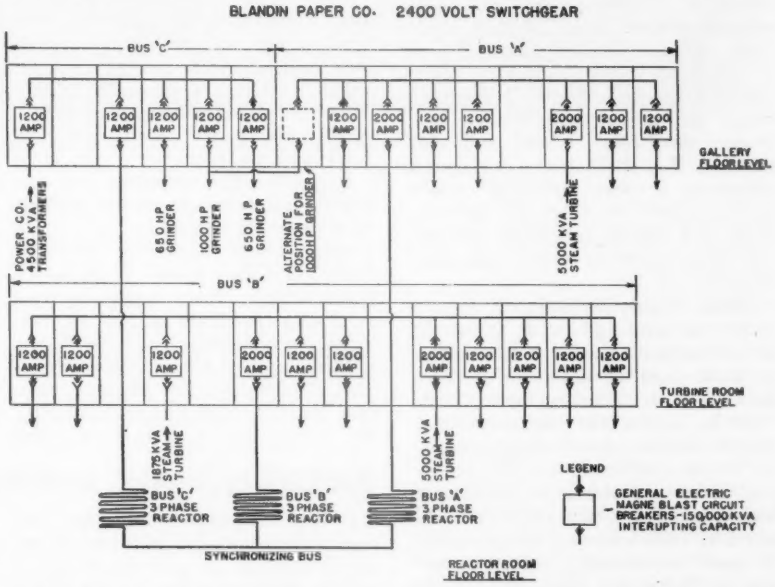
Unusual Switchgear Equipment

From the point of view of engineering ingenuity in the industry an interesting example is one that PULP & PAPER Industry found at the Blandin Paper Co., in Grand Rapids, Minn. This was the manner in which the company keys the use of purchased power in with power of its own generation in new switch gear equipment installed in the past year for Blandin's 2,400-volt system. George W. Goelz, Blandin power plant engineer, pointed out this arrangement, as shown in a chart accompanying this article, is unusual in that it was built to care for a number of conditions that had to be covered to provide complete protection and operating flexibility.

The Blandin mill has a small hydroelectric power plant 5 miles from the mill with no direct transmission. The station is connected with the system of the power company. Net purchased power is metered input at the mill less hydro generation, which depends on water supply at Blandin's own plant. So that system disturbances won't reflect unfavorably on speed regulation of the paper machine, Blandin operates grinders direct from the power company lines and varies combinations of grinders in order to balance off its hydro (see drawing for further explanation).

"The entire arrangement is very satisfactory and we are very pleased," said Mr. Goelz.

UNUSUAL ARRANGEMENT of new switchgear equipment for Blandin Paper Co. to provide complete protection and operating flexibility in using both public power and the mill's own power plant.



The sketch shows the bus arrangement with reactors between buses. The purpose of the reactors is to limit maximum circuit KVA to within rating of circuit breakers. Reactors are placed between buses rather than in generator leads because there is no power loss in reactors except when there is an exchange of power between buses. If the buses were operated independently on their own generators there would be no power consumed at all in reactors, and no need for current limiting action since possible short circuit contribution on any one bus is within limits of breakers. Blandin's small hydro-electric power plant is about five miles from the mill with no direct transmission line. The generating station is connected into the system of power company, and Blandin takes power at mill from power company high line. This means Blandin must take a variable quantity of power from the company's system depending on availability of the water at its own hydro plant. It has a contract with power company for a block of purchased power bought on contract with a KW demand basis for billing. Net purchased power is metered input at mill less hydro generation.

Blandin found it isn't desirable for its steam plant to tie in with power company system to operate in parallel because system disturbances are reflected unfavorably on speed regulation of paper machine. Therefore it operates a combination of electric grinders direct from power company's lines, and varies number and combination of grinders so hydro is balanced off and contract demand approached. Frequency variations or even short power interruptions do not affect operation of mill. The combination of grinders Blandin is now using is shown on sketch. The alternate position of 1,000-hp. grinders on "A" bus is so interlocked it is impossible to get two circuit breakers in on same grinder and get the equivalent of a short circuit between buses "A" and "C." During periods when steam plant is shut down all buses are tied together through the synchronizing bus and all power is drawn from the power company system.

Sealing Motors From Flood

Among engineering developments, one of the most interesting is that of sealing electric motors against damage from flood waters. In the post war expansion program carried out at the West Linn, Ore., plant of Crown Zellerbach Corp., six General Electric motors are being installed which are protected against damage from water, even though the water completely covers the motors.

The mill's grinding rooms are backed right up against the Oregon City falls to take advantage of water power for driving the grinders. During the flood stage the waters of the lower river rise until the level below the falls sometimes is 8 or 10 feet above the floor of the grinder room.

In expanding the mill advantage is taken of both water power and electric power. Six 2300 h.p. electric motors are being installed, five of which are in No. 2 grinding room and one in No. 3. In No. 2 grinding room the motors are located between the water wheel and the stones. The shaft from the water wheel is in line with the motor shaft which in turn is in line with and abutts the shaft driving the three stones to which it is connected.

These General Electric motors weigh 36 tons apiece, so it would be impractical to remove them even in flood stage when the lower river backs into the grinding room. With view to sealing the motors against water during these flood stages, each unit is enclosed in a steel housing which is ribbed to withstand high pressures which might be exerted by high waters. This housing is made water-tight, using gasket joints. There are four vent ports, two on each side, and one at the top. Water-tight covers are placed over these vents with approach of flood danger and the packing glands around the shaft at each side of the motor are drawn tight. Air under pressure is then applied to the inside of the motor so that the internal air pressure is higher than the pressure applied on the motor by the water. In case there are any leaks in the housing the air escapes through the leaks, preventing the water from entering.

With the motor set between the water wheel and the grinders it is possible to obtain any of three combinations. By disconnecting the motor shaft from the grinders, the water wheel is used to drive the electric motor which then becomes a generator. If the motor shaft is connected to the grinder shaft and disconnected from the water wheel, the motor then powers the grinder. The third alternative is to connect water wheel shaft to motor shaft which is in turn connected to the grinder shaft, and by so doing the water wheel powers the grinders, and the field of the motor is disconnected. Hence in flood stage the motor can be operated as a generator; when the water is low it can be used for driving the grinders.

Power Balance in South

In their perambulations around the country in gathering material for this article, our editors were told to be sure to look into the National Container Corp.'s power balance at Jacksonville, Fla., which was described as "one of the finest in the industry."

One thing about it, this power unit is limited by space and is really "part of the mill" with machine tenders and all hands keeping a close watch on steam use. Daily reports are made on oil consumed per ton of production, gross steam per ton, KWH per ton, etc.

In continuous operation are one 30,000-lb. bark-burner, one 60,000-lb. recovery boiler converted to bark burning, one 30,000-lb recovery boiler, and one 80,000-lb. recovery boiler (one recovery boiler was used in the past). Steam balance is provided through use of one 100,000-lb. oil-fired boiler. All boilers are operated at 400 lbs., 700 degrees Fah., and design prevents increased levels. The tabulation of steam in demand percentages and finished board are as follows:

	Oil	*Black Liquor*	*Bark*	*Hogged Wood*	*Total*
Per cent	36	40	18	6	100
Lbs. per ton finished board	5400	6000	2700	900	15,000

Steam requirements for the mill include 5,000 pounds to paper machine, 3,000 to evaporators, 3,000 to digesters, 1,000 to caustic house, 1,544 to condensors, 365 to ejectors, 1,050 to boiler blowdown, and 1,100 to feed water heating, or a total of 16,059. Of these amounts, the digesters, caustic house, ejectors, and boiler blow-down are non-returnable. Gross requirements for feed water amount to 5,415 of treated make-up per ton of finished board, or 36%, which accounts for a large amount of heat. Steam returnable to condensors amounts to 10,644 as against a gross of 16,059 pounds per finished ton. The mill uses 1,544 lbs. of steam per ton of production to the condensor to force steam-electric balance.

A general trend in motors is toward a higher degree of reliability. Engineers told our editors of uses of high intercepting capacity fuses (used at a plant in Cloquet, Minn.) and other methods of isolation of motors, for as mills get larger and more power is needed, there is great danger of damage and injury. One big Louisiana mill is interested in new means of distribution and safety factors for a proposed enlarged power plant.

RECOVERY PLANT ENGINEERING

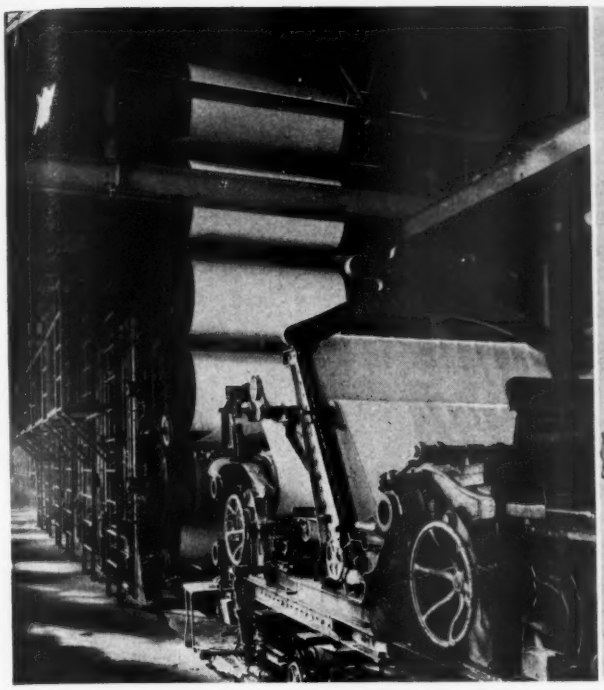
A Quebec engineer mentions the trend towards large recovery units which provide greater economy in steam generation and at the same time more complete recovery of chemicals. "In this connection," he says, "might be mentioned the use of 'air puff' system of blowing tubes instead of the previously used steam soot blowers and lancing methods. In the case of evaporators, some reference might be made to the use of multi-stage evaporators using high vacuum which provides greater steam economy than the type previously employed. New evaporators use stainless steel tubes and stainless clad heaters in one or two stages at the strong end of the system."

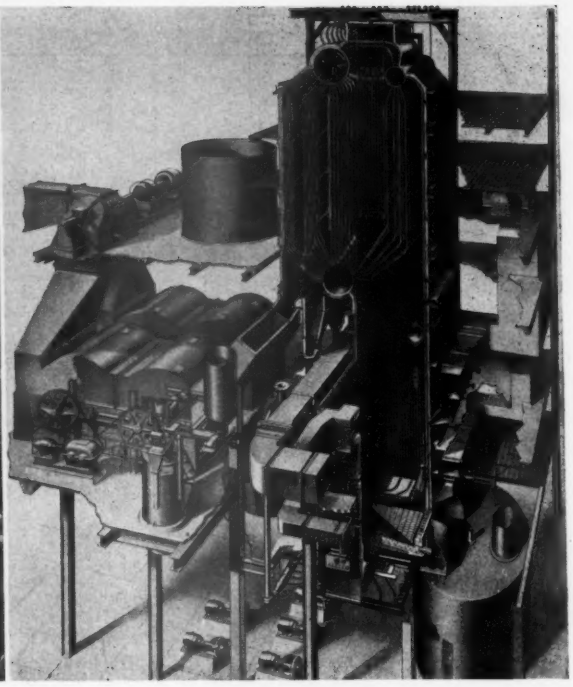
Magnesia Base Recovery

It will only be possible to discuss all the demonstrated commercial-scale economic aspects of new magnesia base recovery and power plant now under construction at Weyerhaeuser Timber Co.'s sulfite pulp operation in Longview, Wash., after it gets into operation this year. It is likely to be even another year before all minor changes are made and a permanent installation effected.

But, meanwhile, for the purposes of this article, we may mention briefly some of the interesting engineering aspects of this departure from the orthodox calcium base cooking system.

The magnesia recovery plant will be smaller than the sulfate recovery plant also being built for the new Weyerhaeuser kraft mill because of the difference in the design of the two types of recovery furnaces. However, the net heat recovery from sulfite waste liquor per unit of organic waste burned will be considerably larger because less heat is absorbed by reduction in burning sulfite waste liquor than in the case of sulfate waste liquor. Also less





AT LEFT: FOSTER PAPER CO. goes "up in the world" for more production.
An interesting story of how these stack dryers were installed on Downingtown machine at Foster Mill in Utica, N. Y., is told by Plant Engineer Eymer in the accompanying article.

AT RIGHT: First unit of kind in industry—a high pressure recovery unit to burn black liquor from the soda pulp process at S. D. Warren Co., Cumberland Mills, Maine.
Generating steam from black liquor it recovers chemicals and generates 95,000 lbs. per hour of 560 psi, 725-F steam as by-product. It includes new 3000 kw noncondensing turbine generator—four steam systems at 560, 150, 360 and 10 psi. Existing boilers and 4250 kw of condensing turbine capacity are retained and tied in. This is described in the article on these pages.

heat is lost in the magnesium oxide ash than is lost in the soda smelt from the kraft furnace. It is expected that both power units will be under the supervision of one operator who will deliver recovered chemicals to both the sulfite and sulfate mills.

Waste liquor from the sulfite process is a serious problem to the industry. For every ton of cellulose produced, over a ton of other organic material is dissolved from the wood. These organic materials together with sulphur and base employed as cooking agent make up the sulfite waste. As has been pointed out in the past, a continuing expense is involved in purchase of cooking chemicals which are discharged with the waste liquor and an economic loss results from discarding over 50% of the organic material from the wood.

Attempts to evaporate and burn sulfite waste liquor using calcium as base have resulted in difficulties in scaling of evaporators due to the resultant deposits of insoluble lime salts. Besides, burning of evaporated lime base liquor results in calcium sulfate, the lime and sulfur combining, from which it is not economically feasible to recover the original sulfur and lime used to prepare the cooking acid.

With magnesium as a base the waste liquor can be evaporated without danger of resultant scaling of evaporators, and with the burning of evaporated liquor the magnesium is recovered as magnesium oxide, which is the original material used for the prepartion of the cooking acid. The combustion heat can be used for heating boilers and providing steam.

The sulfur present in the waste liquor passes off in the combustion gasses as sulfur dioxide and can be recovered in suitable absorption towers, using a slurry of the magnesium oxide ash from furnace as the absorbing agent.

It is thus possible to recover almost completely the chemicals used for extracting the cellulose from wood and at the same time convert the energy present in the organic material into process steam and power. When properly conducted, the process can be expected to result in sufficient energy available from the waste liquor to furnish the process steam and power required by the pulp mill, resulting in a cycle which is practically self sustaining.

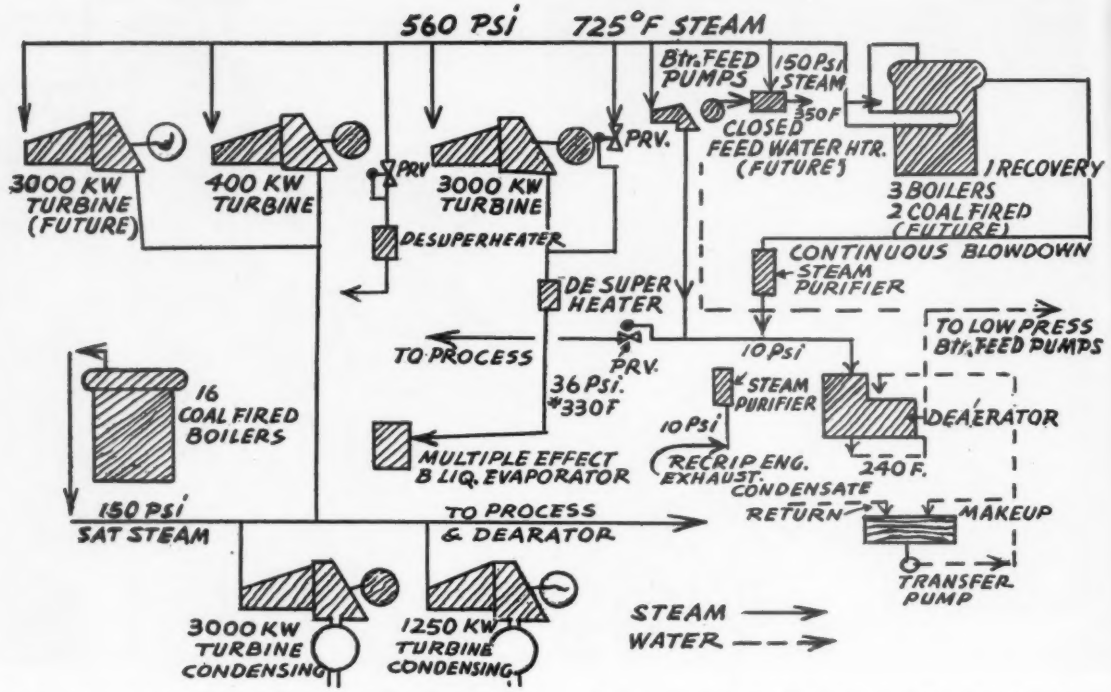
Pilot plant operations have indicated loss of chemicals in the magnesium process will not exceed 10 per cent, reducing the sulfur consumption from 275 pounds per ton of pulp to 27 pounds per ton. Because of the lower molecular weight of magnesium as compared to calcium, the consumption of magnesium oxide would probably not exceed 14 pounds per ton of pulp. In addition to economies effected in chemical recovery, there will be the energy recovered from the organic material in the form of process steam and power.

First Unit of Kind

What is said to be the first unit of its kind in the soda pulp industry is part of an initial installation in a new steam and by-product power plant at S. D. Warren Company, Cumberland Mills, Maine. This part is a high pressure recovery unit to burn black liquor from the soda pulp process. According to R. E. Gilman, of the engineering department of the mill, it is the first unit of this kind.

Generating steam from black liquor, the new unit recovers valuable chemicals for pulp processes and generates 95,000 lbs. per hour of 560-psi, 725-F steam as a by-product.

The initial development includes



GENERAL DIAGRAM SHOWING STEAM AND WATER CONNECTIONS of new 560-psi soda mill recovery steam generating unit, new 300-kw back pressure turbine, existing 150-psi boilers and condensing turbines, evaporators and other equipment in new S. D. Warren power plant at Cumberland Mills, Maine, and illustrating how four steam systems at 560, 150, 36 and 10 psi are interconnected for economy and reliability.

a new 3,000-kw non-condensing turbine generator unit. Coordinated are four steam systems at 560, 150, 36 and 10 psi. The existing boilers and 4,250 kw of condensing turbine capacity are retained and tied into the system.

Future steps in the plant development will include a 4,000-kw back-pressure turbine generator, two 560-psi coal-fired steam generating units and later a 3,000-kw back-pressure unit. There are air-puff soot blowers and design details for cleaning unit, and a steam air heater for heating combustion air is supplied to the black liquor furnace.

In the exaporating department, an interesting new installation now going into a mill near Pensacola, Fla., is the first Babcock & Wilcox cyclonic evaporator in the South.

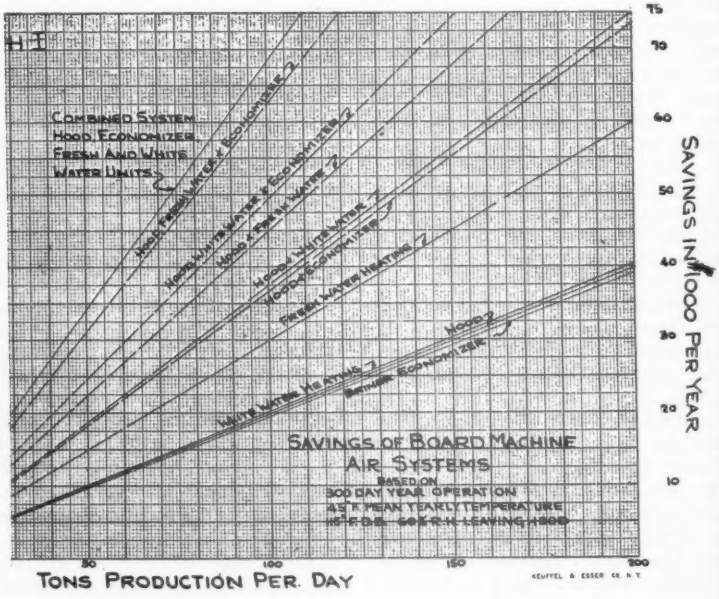
Savings in Board Mill Systems

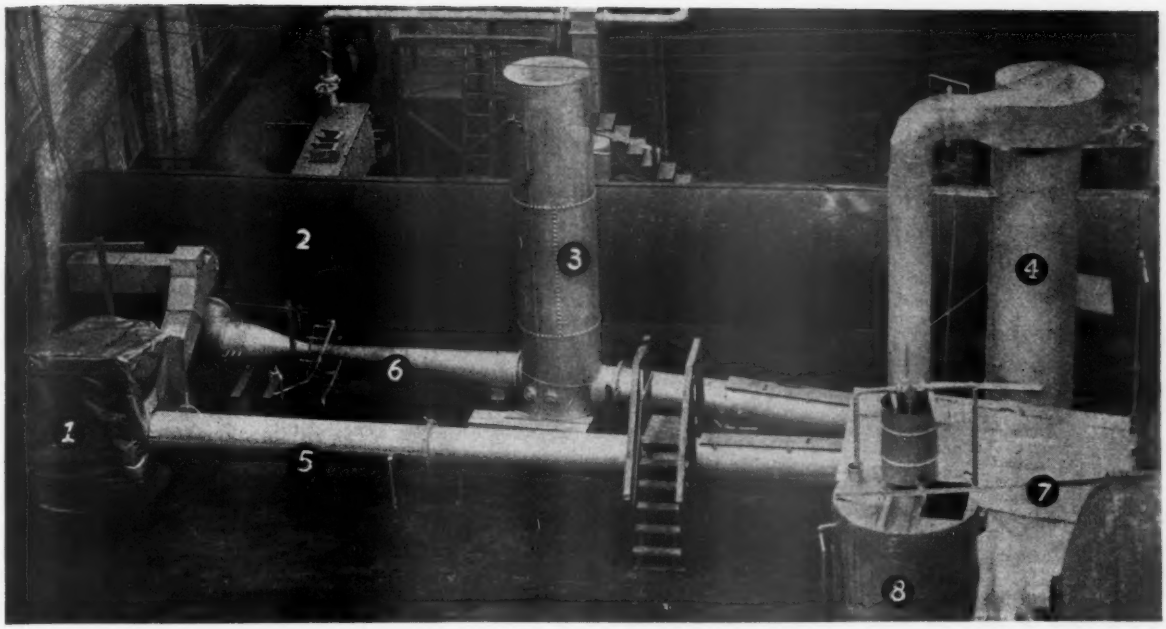
Regarding drying and air systems in board mills, W. K. Metcalfe, of J. O. Ross Engineering, shows vividly in a chart published herewith the savings that can be accomplished for a mean year temperature of 45 degrees, 300 day operation at 50 cents per 1,000 lbs. steam cost.

Installation of a hood will save 20 to 25% on the steam required for a mill obtaining similar results without a properly designed hood. By installing a white water system, approximately 20% of the heat added as the air passes through the mill, can be reclaimed. By installing a Briner economizer system, approximately 20% of the heat added can be recovered, and by installing fresh water heating system, approximately 30% of the heat can be reclaimed.

"Add them together, you have no need of a steam plant," quipped Mr. Metcalfe. "If we go one step further, we would have perpetual motion, and we would no longer have to make board. We could retire to California. Unfortunately, it is only possible to reclaim a total of about 60% of the heat added by the mill with all four units."

A. E. Montgomery, western manager for J. O. Ross, conducted a lively round table at TAPPI's con-





SUCCESSFUL PILOT PLANT for chemical dust recovery from gases of a kraft recovery unit at Thilmany Pulp & Paper Co., Kaukauna, Wis. Equipment consists of high velocity venturi throat (a type of contracted and expanded throat usually used to measure flows) with liquor sprays at the throat. Equipment was developed by Pease, Anthony Co. of Waltham, Mass.
Parts of the equipment shown above are: (1) Fan house; (2) Main duct; (3) Retention tower; (4) P.-A. Scrubber; (5) Gas orifice; (6) Venturi; (7) Pump House, and (8) Scrubbing liquor tank.

vention on drying problems, in which he stressed that drying is fundamentally a heat transfer problem. A questionnaire to 30 mills asking if dirt or grease inside rolls acted against heat transfer, brought replies that if dryers were dirty enough, they should be cleaned.

In this department, an interesting recent installation was at Union Bag & Paper Corp., Savannah, Ga., where an air tunnel and system have been installed to get more air into a machine and drying rooms. If successful, it may be tried elsewhere.

Kraft Dust Recovery

In the recovery field of the kraft industry, an interesting experiment in chemical dust recovery from gases of chemicals recovery unit has been conducted at Thilmany Pulp & Paper Co., in Kaukauna, Wis., as mentioned by Vice President C. R. Seaborne in the previous section of this article. It is of course applicable to soda mills, too.

This has been developed successfully on pilot plant scale. Equipment consists of a high velocity venturi throat (a type of contracted and expanded throat usually used to measure flows) with liquor sprays at the throat. Waste gases pass at high velocity through the venturi to the sulfate furnace stack. At the same time recirculated water injected into the construction is atomized by energy of the gases under extreme turbulence in the throat and is then removed in a dry cyclone following the venturi atomizer. Efficiency of sodium removal of as high at 99% have been attained by a combination of the venturi atomizer followed by a conventional Pease-Anthony scrubber instead of a cyclone.

The combination of a venturi atomizer followed by a dry cyclone, called the Venturi-Scrubber, has given 85 to 94% sodium recovery on a pilot scale with an estimated power consumption for large scale operation of approximately 43 kw.hr./ton of pulp.

Because of the easily attainable high efficiency, low first cost, and simplicity of operation of the Venturi-Scrubber, the addition of any other equipment to the combination to improve the efficiency seems economically unjustifiable.

The equipment was developed by Pease-Anthony Co., 257 Trapelo Road, Waltham 54, Mass.

Along with recovery and use of tall oil and turpentine at Thilmany, Mr. Seaborne estimated recovery at rate of $2 per ton of pulp in 1947.

Canadian Installations

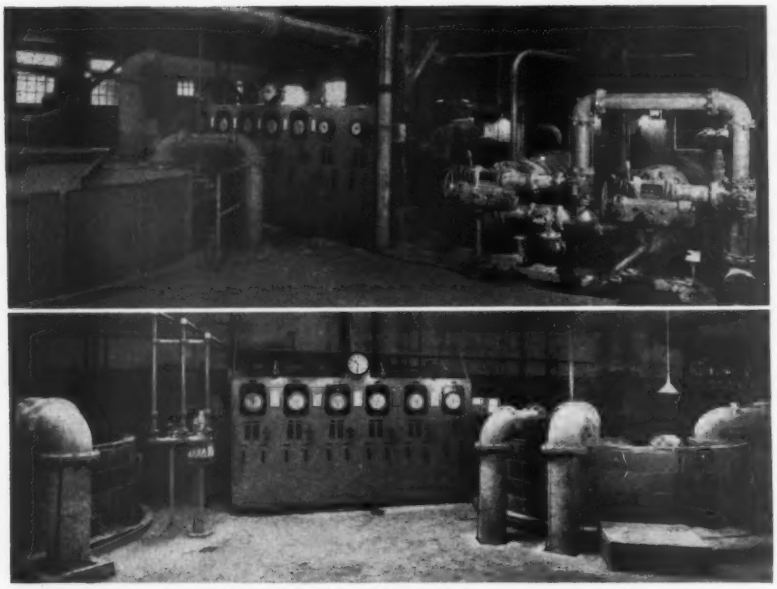
A Quebec engineer refers to installation of lime burners in numerous Canadian mills to reclaim lime sludge, resulting in a greater economy in consumption of lime. "Very often," he states, "a green liquor clarification system and continuous causticizing system is installed simultaneously to be used instead of the batch arrangement as formerly used."

For instance, Pacific Mills, Ltd., at Ocean Falls, B. C., has just completed installation of a Dorr continuous causticizing system. Pacific Mills, incidentally, is also installing a zinc hydrosulfite bleaching and washing system, consisting of two 8 x 16 feet rubber-lined Oliver washers capable of handling at least 265 tons of groundwood pulp a day. The zinc hydrosulfite is added prior to the washers where it is in contact with the groundwood pulp for a suitable retention period before it is removed by the washers.

PULP PREPARATION

The subject of continuous pulp preparation is one of the most interesting and at the same time, one of the most controversial in the industry. The trend away from old batch handling of materials to continuous flow operations, so modern, so economical and so interesting in all process industries today, is no better exemplified than in this phase of pulp and papermaking.

It seems pretty well agreed among most observers that certain new machines are suitable more than others



AMONG SOME OF THE MOST MODERN EQUIPMENT for paper mills is the system of "push button" centralized control for pulp preparation as shown in above pictures taken at Finch, Pruyn & Co., Inc., Glens Falls, N. Y., by PULP & PAPER Industry especially for this engineering review.
Top View: Dilts 14-ft. Hydrapulper at left and Morden Stock-Makers at right with panel board for controlled pre-treatment of stock. Taylor instrumentation is used. Divisions on panel board are described in column below.
Lower View: Furnishing chests for paper machines and another operations panel to control mixers, as described below.

for certain types of refining, depending on materials used—wood, pulp, chemicals—and depending on the kind of paper or product wanted. E. D. Jones & Co., Morden Machines Co., Shartle-Dilts and Sutherland Refiner Co.—to name leaders in this field in alphabetical order—each have a different approach and different application to the problem.

E. D. Jones has been continually improving its jordans, making them of different materials to add to life and improve operation.

Push-Button at Finch, Pruyn & Co.

One of the most modern engineering arrangements for preparation of pulp and of machine furnishes is at the Finch, Pruyn & Co. groundwood and paper mill at Glens Falls, N. Y., where controls of all stock preparations are centralized. Power and space saving, push-button operation and uniformity of product are among the advantages this system gives to this mill which makes printing and similar papers. Compact Morden Stock Makers, a Hydrapulper, high speed E. D. Jones jordans and modern instruments and meters are utilized.

In its refining layout Finch, Pruyn is pre-treating its sulfite requirements before mixing with the groundwood. The old beater room has been dismantled, and now up to 45 tons of completely treated pulp can be processed to serve the three paper machines. Admixture of pulps and chemicals is controlled by remote hydraulic valves and measured by Taylor instrumentation. Size is measured in through a Bowser meter, and at a later date other chemicals are to be measured through a metering system. In this fashion the preparation of furnishes for the paper machine is controlled by an operator at a panel board, making for compact and precise regulation.

Pulp is disintegrated in a newly installed 14-foot Hydrapulper, then pumped to a chest from which it may be pumped in turn through two Morden Stock Makers set up to operate either in series or parallel operation. It follows then to three sulfite treated pulp chests, one for each of the three machines. Flow is remotely controlled in the operation, and propeller agitation is provided in the chests. The sulfite slushing and pre-treatment panel board is divided into units representing the indicating and control equipment corresponding to each stage of the treatment. Thus there are divisions affecting the Hydrapulper, No. 3 sulfite chest, No. 2 sulfite chest, storage chest, and No. 1 sulfite chest, in that order from left to right on the panel board.

The preparation of the machine furnishes is made in the vertical mixing chests, one to each machine, to which can be flowed any quantity of the two grades of groundwood and the sulfite pulps specifically treated for the machine involved. A wide range of stock furnish is possible, and the new groundwood peroxide bleach will further increase the versatility and flexibility of the new system. Before reaching the paper machines the stock is treated by small high-speed E. D. Jones jordans, installed two for each machine and operating in parallel.

The paper mill organization executives brief the advantages of the system as follows: Pre-treatment of the sulfite alone results in considerable advantages in developing pulp characteristics that are desirable. The pulp, they say, has been treated to a degree that is optimum for the particular paper being made on the individual machines. The remote control of furnishing, they point out further, has resulted in overall observation of the process from one vantage point in the mill. With the latter advantage is combined instrument records, and a continuous record of variables.

At Espanola

Installation of a pretreatment system to pre-refine the output of the kraft pulp mill and bleach plant at the Espanola, Ont., mill of the KVP Co., Ltd., subsidiary of Kalamazoo Vegetable Parchment Co., is regarded as one of the most advanced moves in the industry because KVP is thus able to ship pulps in lap and sheets of specified freeness and strength. Contract for the job was carried out by Alexander Fleck, Ltd., Ottawa, Canadian associate manufacturers for Black-Clawson, Shartle and Dilts.

The stock preparation system is operated continuously and is completely equipped with process control instruments and remote control stations, centralized at an operating panel adjacent to the technical control laboratory.

The equipment consists of eight No. 1 Dilts Hydrafiners driven by 250 h.p. motors equipped with hydraulic remote control means for adjusting and hydrafiner plug setting. The Hydrafiners operate as individual units in parallel arrangement and each unit is supplied from a common constant level headbox of stainless steel inlet.

At Charleston Mill

For the purpose desired by West Virginia Pulp & Paper Co. at Charleston, S. C., Superintendent Charles A. Shoudy stated that the

Sutherland disc refiners reduce overall consumption and made it unnecessary to purchase a new power generating unit at that mill to step up production at that big pulp mill. A considerable expansion has been undertaken at this mill formerly rated at 500 tons daily. It now has ten Sutherlands. In summarizing the Sutherland refiner experience, Mr. Shoudy said that in measurement of capacity on 42-pound stock, the Sutherland is equivalent to 1.3 Noble and Wood jordans. One refiner on bottom stock accommodates 55 tons per day; on top stock 37 to 39 tons per day. While handling a greater capacity of stock, the Sutherland consumed 63 or 64% as much power as a jordan, he said.

In respect to maintenance, Mr. Shoudy said the jordan has an indeterminate life whereas the discs of the refiner must be changed every six months.

Digester Equipment

In the chemical operations of pulp mills in both Canada and the U. S., there are other interesting installations. The first stainless steel lined all-steel sulfite digester has been installed at the Port Angeles, Wash., mill of Rayonier Incorporated and described fully in a recent issue. This digester, lined by A. O. Smith Corp.'s very close, electrically-spot-welded process is expected to reduce maintenance and lost time for mills using high percentages of corrosive chemicals.

Carbon linings of a number of kraft digesters in Southern and Northern mills have been done by Stebbins Engineering Co. of Watertown. Babcock & Wilcox announces that it has made its first alloy-clad rotary digester. They are made with a chromium alloy liner.

The first central control operations board for all the digesters and equipment in a sulfite digester house has been introduced in eastern Canada. Among innovations at the new Marathon mill in Ontario is a seven-port Spangenberg blow valve connection with all seven digesters and whose operation provides for a single line entering the blow tank.

A Quebec pulp mill engineer draws attention to the use of stainless steel of various compositions as one of the year's outstanding developments. Stainless steel is now being used in both the acid and alkaline pulping processes and this applies to all digester fittings, condenser tubes and headers, heaters, pumps and so on. In the case of groundwood pulp there has been a trend towards high power units, and the use of artificial stones allows motors of 4,500 to 5,000 h.p. to be used on each line of two stones.

Six chromium alloy lined rotary digesters are to be built by the Babcock & Wilcox Company, Barberton, O., for use in the manufacture of sulfate pulp at Crown Zellerbach Corporation plant at Camas, Wash. Of these digesters, five weigh 77,000 pounds each, and the other is slightly smaller. These are the first alloy-clad digesters the manufacturer has furnished for the sulfate pulp and paper industry.

Two exclusive Babcock & Wilcox features are embodied in construction of these vessels. One is the process by which the alloy lining is resistence-welded to the base metal; and the other, patented by the company, is the design covering the construction of a heavy center girth section extending around the entire circumference of the units. Trunnions are attached to this girth section, permitting rotation of the digesters, end over end, at approximately one to two revolutions per minute. The girth section is designed to distribute stresses in such a manner as to make them uniform and of low value, consistent with applicable ASME unfired code requirements.

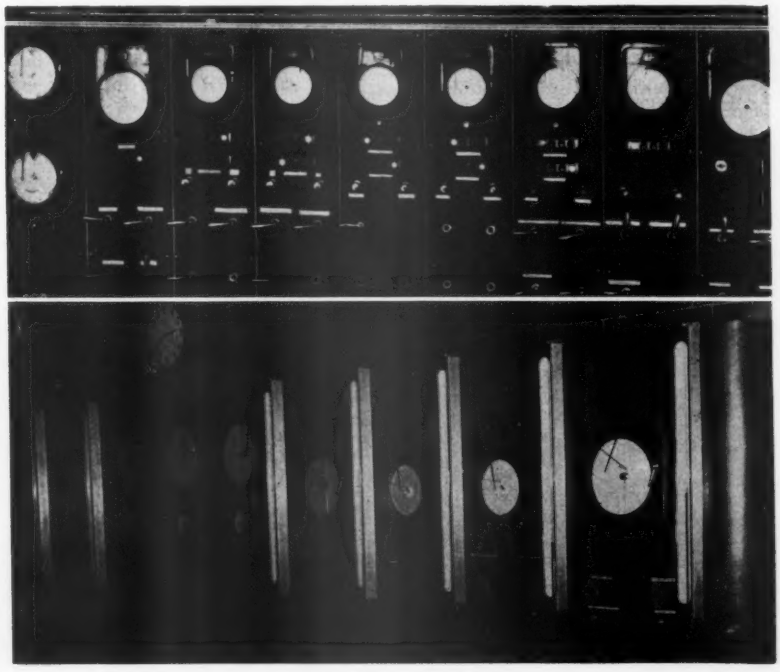
The digesters have an inside diameter of 10 feet 3 inches, and are 30 feet long over the end flanges. Each end is fitted with a cone 1⅝ inches thick. The shell is made of 1⅛-inch steel plate with a heavy reinforced section around the middle.

Steam is introduced through one of the trunnions, terminating in an alloy piping arrangements inside the digesters, fitted with a perforated ring for intimate and quick cooling. This piping is made up of chromium alloy, the same as the lining material for the shell. All openings are protected with weldmetal alloy gasket faces.

The vessels are designed to work at 150 pounds pressure and up to 650 degrees F., although the usual temperature will be in the neighborhood of 340 degrees. Because of the high loading on the shell, the Babcock & Wilcox firm has drawn from its experience in designing the reinforcement for the Boulder

HERE ARE TWO EXAMPLES of centralized control boards for pulp preparation systems, discussed in this article. At top is the control at the Booth Ltd. mill in Ottawa, Canada, where a Shartle-Dilts-Alexander Fleck system of Hydrafiners and Hydrapulpers has been installed. Its salient feature is the means for clearing broke completely before the batch cycling refining stage of preparation commences. By pumping the Hydrapulper blended stock through the Hydrafiner en route to the cycling tanks, all fibers are out-of-bundle before refining begins and the paper maker has assurance that no underfibered specks of broke or pulp can pass on to his paper machine.

Below is the new Shartle-Dilts board at the Newton Falls Paper Co. mill at Newton Falls, N. Y. Carrying further the push-button operation, the smaller old control board at Newton Falls is now used for a de-inking system



Dam penstock section, applying a similar method to reinforce these digesters.

WASHING AND BLEACHING

One of the most discussed and modern washing systems is the new Swenson-Nyman multi-stage pulp washers at Union Bag & Paper Corp., Savannah, which were subject of a paper at the New Orleans TAPPI meeting last fall. Each of two washers are designed to handle 200 tons of pulp daily.

The term "multi-stage" washing refers to the principle of a totally closed counter flow system with more than one stage of washing on each cylinder. The Swenson-Nyman washers are designed for two stage washing on each cylinder, so that the installation of three drums in a line could provide from three to six stages. The Union Bag installation is being operated with five stages, providing two stages each on the first two cylinders and a single stage on the third and final cylinder.

In dividing the washing cycle into two stages (one for strong, the other for weak liquor), a distinction is created from previous methods requiring separate drums for each stage with intermediate pulping of stock. The sheet is not disturbed during the two stages of washing on the single drum. By separating the intermediate weak wash liquor, the wash water is twice used in true counter-current manner with attendant economy and effectiveness.

Thus, the amount of water required is reduced; washing efficiency is increased; and, dilution of strong liquor is held to a minimum. The result is less water to evaporate and less chemical make-up. Floor space requirements are diminished.

Backwashing is eliminated by fast drainage into deep channels of each section.

The Oliver washers for removal of acid or alkaline black liquor, including the Ringvalve type with two-stage operation on a single washer, are equipped with washer cylinders entirely constructed from No. 316 stainless steel and mounted in tile vats, if they are used handling sulfite hot acid pulp. Rubber covered cylinders in rubber lined steel, or in tile vats, are used as brown stock washers when all liquor is to be wasted. Latest type Oliver Vacuum savealls, made for decreased maintenance and better recovery and capacity, are made with cast iron manifold and bronze or stainless steel fittings, or a type for fine paper mills is made with rubber covered and stainless steel design. Drums may be mounted in tile vats. All Oliver savealls have bronze or stainless steel trunnion sleeves, removable moulded fabric main bearing liners, and a heavy duty antifriction bearing fully enclosed worm gear drive.

M. & O. Bleach Plant

Bleaching has become so important in up-grading of pulp and paper products to get companies into more lucrative and less competitive markets, that a demand for engineering skill in these installations has intensified.

New groundwood peroxide bleaching processes have increased brightness and permit holding of brightness longer. Several mills have installed these processes of which the DuPont Company is one of the pioneers. In almost every mill, the engineers determine on a little different way to set up the operation.

In the expansion underway by Minnesota & Ontario Paper Co., the installation of most general interest is probably the bleach plant at International Falls, Minn. Hardy S. Ferguson is in charge of design and Impco equipment is being supplied.

J. H. Davidson, chief engineer of M & O, pointed out an interesting alternative use of part of the plant for groundwood and sulfite. He also called attention to central operation and many other new features.

The main building is laid out for 6 stages of kraft bleaching and for 4 stages of sulfite bleaching, but instead of installing all the sulfite equipment at this time M & O is ahead with only a portion of it and that portion is modified for the bleaching of groundwood by the sodium peroxide process. The sizes of the high density caustic and low density hypo towers for 100 tons sufite were found to be well suited to high density Solozone and low density retention for 75 tons groundwood daily, so the plant is being built on this basis. A sketch on these pages indicate this arrangement.

Many new features are being built into this plant. All operation and control is centralized on the top operating floor where the washers are located. Variable speed drives are direct current motors with individual AC-DC motor generator units. Instruments include stock level recorders, temperature controllers, flow meters, etc., are assembled at a central control panel in the main operating aisle.

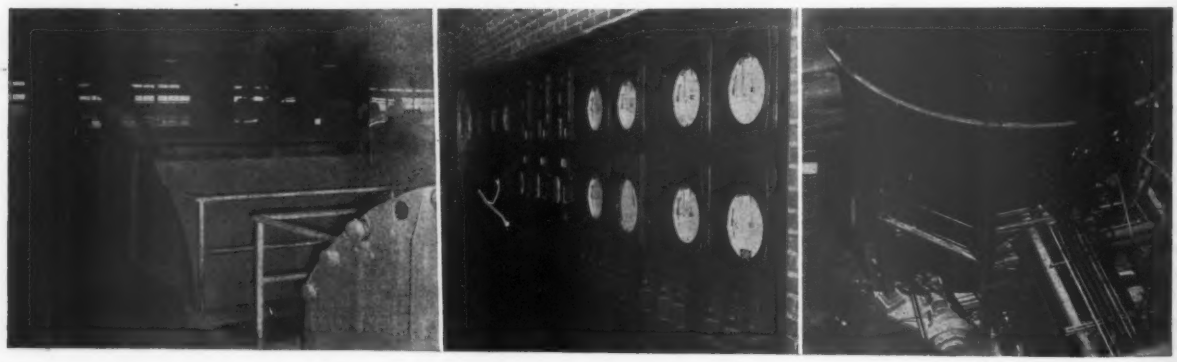
Adjoining the main bleachery building, on one side is a brown stock storage and caustic storage building, and on the other side is a bleach liquor making building. Separate buildings are provided for the preparation of sodium silicate and for the storage and preparation of the chemicals for the groundwood

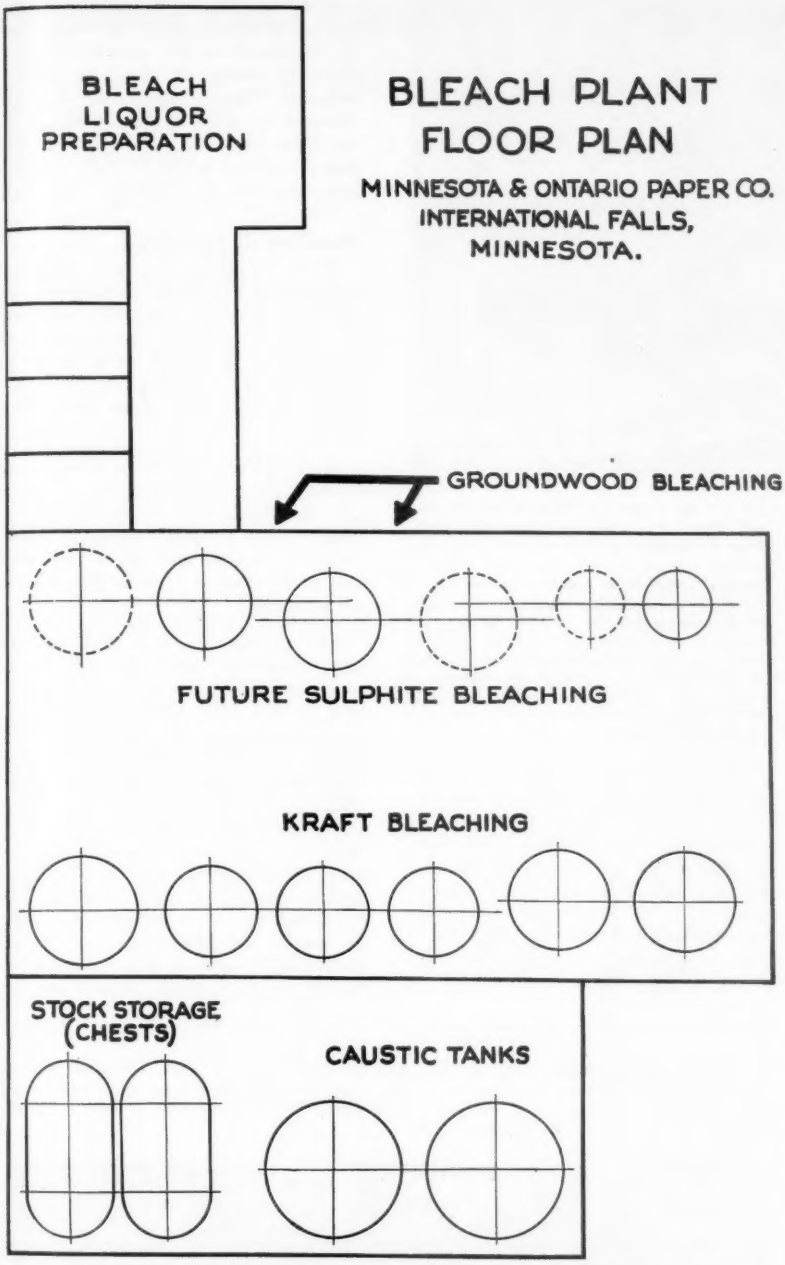
SWENSON-NYMAN multi-stage washers at Union Bag & Paper Corp., Savannah, were subject of discussion at New Orleans TAPPI sessions. Left to right in these pictures are:

View of the washer installation described in accompanying article.

Foxboro controls which record measure of liquor low to evaporator and hot water flow.

Cone-bottomed tank made and erected by Chicago Bridge & Iron Co., who supplied two for high density pulp storage and one blow tank as well as liquor storage tanks and foam towers.





This sketch shows arrangement of new bleach plant at M. & O. Paper Co., International Falls, Minn., designed by Hardy S. Ferguson with equipment from Impco. Interesting engineering accomplishment is that instead of installing all sulfite equipment at this time, a portion of it is modified for bleaching of groundwood by sodium peroxide method. All control is on top floor where washers are located. Stock level recorders, temperature controllers, flow meters, etc., are assembled at central panel.

bleaching. Provision is made for expansion to double the present plant capacity.

An ample supply of pure process water for the bleachery and for use on the paper machines will be available upon the completion of the water treatment and filtration plant which has a capacity of 15,000,000 gallons per day. Stock preparation equipment and paper machine alterations are also under way, which will assure complete facilities for the utilization of the bleach plant output to the best advantage.

Crown Z's Bleach Plant

Safety and convenience, quality and uniformity of product and pleasing appearance are stressed in engineering of Impco equipped kraft bleach plant at Camas, Wash., which will go to seven stages, which is about the ultimate for this process. Crown Z engineers are designers.

Here again, operation centers at a top floor central panel. A system of interlocks will provide safety, the most important being chlorine flow cutoff when stock to towers is interrupted.

High density towers are of the Thorne type with bottom extraction, and dump chest for dilution ahead of the washer. The low density towers are of the upward flow type with vertical agitation and overflow at the top. The cells are arranged in two parallel rows with all high density on one side, and all low density on the other. This permits a more compact process with savings in building and piping, and contributes to convenience of operation.

Addition is being made to the present kraft mill to furnish stock for bleaching. At every stage two duplicate chests will be available in order to permit changing of grades with no mixing. Two high density storage chests will handle 100 tons each of washed brown stock at 13% consistency from the kraft mill. Two 5-ton regulating tanks will maintain a supply of stock for the screens and provide some blending. Two 20-ton chests after the screens will supply the bleach plant, and provide blending of stock to eliminate fluctuations in bleachability.

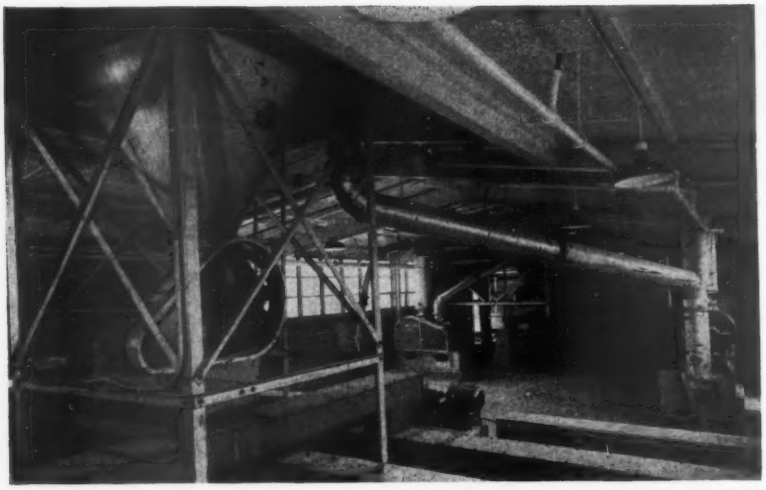
The washers will be arranged in two rows over the cells. The concrete, tile-lined vats will be countersunk into the floor so that the operator can conveniently observe the operation from the floor, particularly on the start-up. An unusual feature will be the Plexiglass hoods over the washers with horizontal vents to the sides of the building, completely eliminating vertical obstructions on the operating floor.

HANDLING AND TRANSPORT

A lot could be said on progress in handling of materials in mills, but we must restrict this report to a few interesting examples.

Clay Handling by "Airveyor"

As American technical progress goes forward the application of new principles is quickly utilized in the post-war industrial expansion. The so-called "vacuum cleaning" principle effectively used in the home type vacuum cleaner has now been adapted to the transfer of clay



AT LEFT OF CENTER IS SHOWN interior view of "Airveyor" unit at Crown Zellerbach Corp., West Linn plant, which transports clay from covered barges to the two new 1,000-ton storage tanks. From the cyclone the clay is fed through the air-lock into screw conveyor which conveys the clay to either of two conveyors of the same tanks, each of which feeds the clay into a storage tank. At right of center at the far end of the building, is shown the "Airveyor" reclaiming system which delivers clay from storage to either of two weigh hoppers.

used for coated paper at Crown Zellerbach Corporation, West Linn, Ore. (See photo).

When the clay arrives at its destination it is transferred from railroad car to barge, barge to storage tanks, and from storage to clay weighing tanks by three separate "Airveyor" systems which carry the powdered clay containing 4% moisture content and weighing 30 to 60 pounds per cubic foot, with "100% retention" of dust in normal operation.

The "Airveyor" systems manufactured by Fuller Co. of Catasauqua, Penn., designed for the transfer of powdered clay, consist essentially of a suction intake pipe, cyclone, air-lock and exhauster. Screw conveyors are used for the distribution of clay from the unit.

At Pulp Siding, the nearest rail terminus to the mill, the clay is transferred from railroad cars via an Airveyor system rated at 18 to 25 tons per hour and discharged to a covered barge for transport across the Willamette river to the Crown Zellerbach mill.

The clay is "sucked" in to the airveyor from any one of three cars spotted on the siding through a fan-shaped nozzle on the end of an 8-inch flexible tube, to a common header leading to a cyclone. The clay enters the cyclone and drops to the bottom and the air is exhausted out the top through the exhaust line which is connected to an exhauster powered by an electric motor. The clay is fed through an air lock into an enclosed screw conveyor, mounted on an adjustable boom, which transports the clay directly into covered barges.

Loaded barges are transported to the mill where the clay is unloaded by a similar system having the capacity of 20 tons per hour. The fan type nozzle and flexible tubing are lowered into the barge by an adjustable boom, where the nozzle is manned by an operator. The clay is "sucked" into the cyclone located on top of two 1,000-ton storage tanks. It is discharged from the cyclone through an air-lock into a system of screw conveyors that distributes the clay evenly in the storage tanks.

The clay is recovered from storage by a 5-inch reclaiming system Airveyor which again, by means of an enclosed screw conveyor, delivers to either of two clay weigh hoppers. The storage tanks may be entered at three different levels to facilitate extracting the clay for the paper-making process. This system has a capacity of 7½ tons per hour.

Handling at Espanola

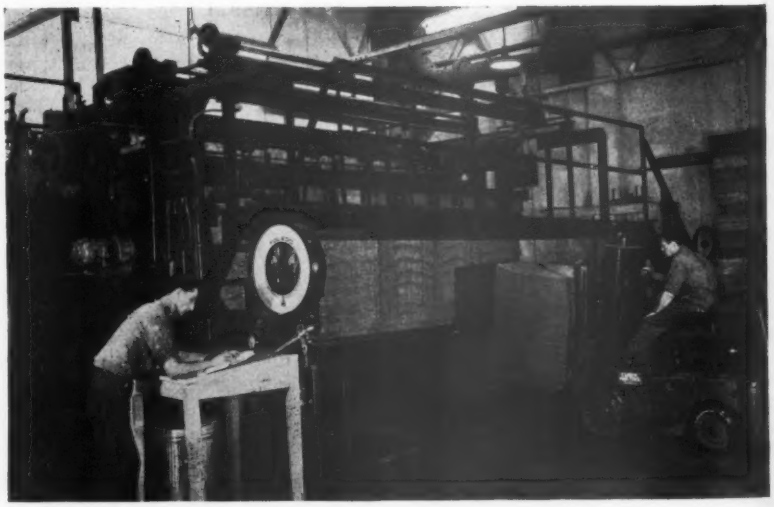
Chief Engineer S. L. Foster of Kalamazoo Vegetable Parchment Co. cited as the best example, perhaps, of greater use of horsepower a method of handling pulp after it comes from the pulp drying machine at the new Espanola, Ont., mill.

Here KVP provides a cutter and layboy that stacks sheets of pulp six feet high and when the stack reaches the proper height, it automatically shoves the stack out onto the scales where it is weighed (see illustration).

The stacks, six feet high, weigh approximately 3,000 pounds each and are picked up by a fork truck and loaded into cars for shipment. One truck driver on each shift is all the manpower needed to take 300 tons, gross weight, from the machine and load it in the cars. One other man is needed on the day shift to clean out the cars and prepare them for use, also to close and batten the doors. On account of the fact that this is full bleached pulp, it has to be well protected from dirt so that care is used to see that the cars are cleaned before use.

(Please turn to Page 159)

AT KVP'S NEW ESPANOLA, Ont., mill, one fork lift truck driver on each shift is all that is needed to take 300 tons gross weight of sheet pulp from the pulp dryer and load it into cars. The truck lifts stacks six feet high, weighing 3,000 pounds. Stacks are automatically weighed before leaving the machine.



SALIENT FACTS ABOUT PULP AND PAPER INDUSTRY

U. S. INDUSTRY STATISTICS

	1939	1940	1941	1942	1943	1944	1945	1946
Total assets (billions)	$2.36	$2.46	$2.61	$2.68	$2.76	$2.81	$2.97	$3.14
Net Worth (billions)	$1.70	$1.77	$1.86	$1.92	$1.99	$2.05	$2.13	$2.29
Net Sales (billions)	$1.45	$1.75	$2.36	$2.46	$2.59	$2.77	$2.88	$3.24
Taxes (millions)	$49	$95	$241	$265	$254	$261	$214	$209
No. of Employes (thousands)	138	146	158	158	150	146	146	167
Wages (millions)	$176	$195	$243	$274	$299	$315	$323	$366
Tons Produced Per Employe	98	99	113	108	113	118	119	111
Wages Per Ton Production	$13.0	$13.4	$13.7	$16.0	$17.6	$18.3	$18.6	$19.7
Index Unit Production Per Man Hour	100.0	104.2	106.7	101.8	94.7	92.7	95.2	(3)
Value of Production (billions)	$1.16	$1.75	$2.36	$2.47	$2.59	$2.77	$2.88	$3.24

Estimates for 1946. Source: American Paper and Pulp Assn. except labor data which is by U. S. Bureau of Labor Statistics.

Our information indicates these totals for the number of companies and mills in the U. S.:

	1945	*1946*	*1947*
Companies	522	517	559
Paper Mills	723	735	656
Pulp Mills	249	242	242

Number of U. S. establishments (pulp and/or paper), and other information over a 100-year period follows:

Year	*No. of Operations*	*Wage Earners*	*Wages Paid*	*Industry Worth*
1849	443	6,785	$1,497,792	$7,260,864
1859	555	10,911	2,767,212	14,052,683
1869	677	18,021	7,208,691	34,556,014
1879	742	25,631	8,970,133	48,139,652
1889	649	31,050	13,204,828	89,829,548
1899	763	49,646	20,746,426	167,507,713
1909	777	75,978	40,804,502	409,348,505
1919	729	113,759	135,690,642	905,794,583
1929	883	128,049	173,077,781	1,250,000,000
1933	781	107,298	99,194,024	(not avail.)
1939	832	137,445	175,687,842	1,700,000,000
1940	854	146,500	195,000,000	1,770,000,000
1941	891	157,800	243,000,000	1,860,000,000
1942	897	157,700	274,000,000	1,920,000,000
1943	900	150,000	299,000,000	1,990,000,000
1944	890	146,400	315,000,000	2,050,000,000
1945	874	145,500	323,000,000	2,130,000,000
1946	837	167,000	366,000,000	2,290,000,000

Source: American Paper and Pulp Association; U. S. Labor Statistics; Census.

Principal Statistics of Canadian Pulp and Paper Industry (1945 is the latest available)

Year	Establishments	Capital	Employees	Salaries and Wages	Fuel and electricity used	Materials and supplies used	Gross Value of products
	No.	$	No.	$	$	$	$
1919	99	275,767,364	26,647	32,264,208	12,503,197	54,084,801	137,912,502
1920	100	347,553,333	31,298	45,253,893	16,989,356	84,208,788	236,420,176
1921	100	379,812,751	24,619	34,199,090	14,961,741	62,276,224	151,003,165
1922	104	381,006,324	25,830	32,918,955	13,000,002	64,692,722	158,950,956
1923	110	417,611,678	29,234	38,382,845	18,421,804	71,322,722	184,821,511
1924	115	459,457,696	27,627	37,649,528	17,396,375	72,233,876	179,259,504
1925	114	460,397,772	28,031	38,560,905	17,506,735	76,514,990	193,092,937
1926	115	501,184,714	31,279	44,175,502	20,424,405	85,365,465	215,370,274
1927	114	579,853,552	32,376	45,674,293	24,024,319	84,813,080	219,329,753
1928	110	685,687,459	33,614	47,322,648	24,546,957	88,490,421	233,077,236
1929	108	644,773,806	34,202	50,214,445	25,356,090	96,874,749	243,970,761
1930	109	703,937,104	33,207	45,774,976	26,158,260	81,992,255	215,674,246
1931	103	630,176,540	26,669	34,792,013	22,927,919	63,947,678	174,733,954
1932	98	597,550,013	24,561	28,348,128	19,821,839	48,970,967	135,648,729
1933	95	559,265,544	24,037	26,657,542	18,902,330	47,632,521	123,415,492
1934	95	554,973,891	26,993	33,307,043	21,977,913	53,426,534	152,647,756
1935	95	545,572,938	27,836	35,893,313	22,682,883	57,995,037	159,325,546
1936	93	536,073,034	29,478	39,440,074	25,690,606	72,202,983	183,632,995
1937	98	570,352,287	33,205	48,757,795	29,121,065	91,121,629	226,244,711
1938	99	594,908,222	30,943	42,619,311	23,800,737	71,062,580	183,897,503
1939	100	597,908,918	31,016	44,737,379	25,094,978	79,933,657	208,152,295
1940	103	642,979,942	34,719	56,073,812	31,045,406	108,758,862	298,034,843
1941	106	678,937,841	37,154	63,677,818	34,437,122	125,437,012	334,726,175
1942	105	655,598,196	38,002	69,656,393	36,226,420	135,970,437	336,697,277
1943	106	667,458,143	37,020	71,199,422	36,211,064	143,956,462	345,653,470
1944	104	*	37,896	75,833,408	37,358,842	157,995,141	369,846,086
1945	109	*	39,996	80,462,644	39,033,131	179,369,499	398,804,515

*Not available.

CANADIAN INDUSTRY STATISTICS FOR 1945

(Latest Available)

		Canada	Quebec	Ontario	British Columbia	Other Provinces
Establishments	No.	109	49	40	7	13
Pulp mills	No.	29	11	8	3	7
Pulp and paper mills	No.	48	25	15	3	5
Paper mills	No.	32	13	17	1	1
Total employees	No.	39,996	19,824	11,712	4,125	4,335
Salaries and wages	$	80,462,644	38,934,914	24,022,401	8,851,835	8,653,494
Fuel used	$	19,344,287	7,792,584	6,181,709	2,364,088	3,005,906
Electricity purchased	$	19,688,844	13,437,885	3,971,622	77,045	2,202,292
Power employed	H.P.	2,082,462	1,114,785	582,572	146,697	238,408
Pulp-making materials and supplies	$	140,668,147	70,472,186	38,729,422	11,376,669	20,089,870
Pulp made	$	231,873,122	114,197,036	62,596,260	21,998,381	33,081,445
Paper-making materials and supplies	$	155,049,809	81,243,520	48,123,179	9,142,934	16,540,176
Paper made	$	282,837,614	148,180,691	86,395,223	20,353,984	27,907,716
Total value of materials and supplies	$	179,369,499	88,056,690	55,689,480	13,480,370	22,142,959
Gross value of products	$	398,804,515	199,172,142	117,797,559	35,304,731	46,530,083
Net value of products	$	180,401,885	89,884,983	51,954,748	19,383,228	19,178,926



PAPER CAPACITY IS BEING RAISED 3½ MILLION TONS AND PULP, 2¼ MILLION

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RESULTS OF PULP & PAPER INDUSTRY'S SURVEY OF EXPANSION—1946-1947-1948

Daily Capacity in Tons

	Pulp		Pulp	
	In 1946	*Additional*	*In 1946*	*Additional*
U. S.-Canada	55,000	9,234	80,000	11,620
U. S. Only	36,700	6,484	64,533	10,415
Canada	18,300	2,750	16,450	1,205
South (U. S.)	14,225	3,840	19,000	5,180
Pac. Coast (U. S.-Can.)	8,710	1,694	6,472	1,945
Midwest-East (U. S.)	13,300	1,715	40,000	3,615
Eastern Canada-Newfoundland	12,000	1,985	13,000	880

Note: Present capacity figures include actual available data or approximations (where round numbers are used).

The survey and summarization of the pulp and paper industry's projected expansion which we published last year in this section of the NORTH AMERICAN REVIEW NUMBER aroused such widespread interest that we have attempted to bring this information up to date in this issue.

In the past year, certain companies told us information they found in this section of the 1946 Review Number entered into their planning. We again present this data in the hope that they will be of further assistance to industry units by giving them a broad picture of the modernization and expansion being undertaken in all regions of the United States, Canada and Newfoundland.

Again, this is a survey conducted by our own field staff of editors in all the producing regions of the continent. Many additional expansion projects have developed in the intervening year. But by far the greatest part of this expansion is in the kraft field where the industry has never yet been able to come abreast of demand.

In virtually every company, our editors have found that expansion has been carefully projected on a long-term study of marketing possibilities. In that respect, the trend differs from some of the over-expansion of past decades. It differs, also, in the fact that expansion this time is not concentrated in any particular area but is spread over virtually the entire continent. And, as for the sky-high market demand for paper—even if it comes down substantially in the next year or two, it will still be higher than present capacities, according to experienced observers.

The new uses of Douglas fir in the Far West, of hardwoods in the South and East, of jackpine in Canada and more economical forestry practices in Southern pine and Pacific Coast hemlock and spruce are among the sound bases for expansion. They not only have made expansion possible but they are tending to permanently balance the raw material supply for many companies.

Total paper-producing capacities for North America above the Rio Grande is being raised during the three year period from 1946 through 1948 by 3,486,000 tons annually (based on daily tonnage figures in the table above). The total capacity in 1945—before the programs got under way—was 23,860,000 tons annually. Thus, total capacity apparently will be brought to the record high figure of 27,346,000 tons.

Some of the additional capacity was functioning in 1946 when production was actually well over 24,000,000 tons.

Total pulp capacity for the U. S., Canada and Newfoundland in the three year period, according to PULP & PAPER Industry's survey, is being increased by 2,770,200 tons annually. Total capacity for pulp before the program was launched totaled about 16,500,000 tons. Thus, annual capacity will have reached some 19,270,000 tons by 1948. About 17,000,000 tons were produced in 1946.

Billion Dollars Being Spent

Probably much more than one billion dollars is being spent on these projects. That figure is, necessarily, a rough estimate based on known average costs for the added pulp and paper tonnage involved. In just one province—Ontario—the bill probably will add up to $100,000,000 based on actual announced figures for most of the work being done there. Today it costs from about $15,000,000 to $25,000,000 to build a mill.

In annual production figures, which are more valuable in many respects than day/tons for practical calculations, here are the results of PULP & PAPER Industry's survey of expansion for 1946 to 1948:

Expansion in Pulp	*Annual Tonnage*
U. S.-Canada-Nfdland	2,770,200
United States	1,945,200
Canada-Newfoundland	825,000
South (U. S.)	1,152,000
Pac. Coast (U. S.-Canada)	508,200
Midwest and East (U. S.)	514,500
East Canada-Nfdld	595,500

Expansion in Paper	*Annual Tonnage*
U.S.-Canada-Nfdland	3,486,000
United States	3,124,500
Canada-Newfoundland	361,500
South (U.S.)	1,554,000
Pac. Coast (U.S.-Canada)	583,500
Midwest and East (U.S.)	1,084,500
East Canada-Nfdland	264,000

We are indebted to many companies which gave our staff of editors confidential information regarding their proposed expansion in order that we could obtain total figures for regions or states. In the



PROJECTED EXPANSION IN PULP AND PAPER IN UNITED STATES—CANADA

Proposed Additional Daily Output in Tons When Expansion Plans Are Completed (See Next Page for Pacific Coast)

Some of the information gathered by this magazine as basis for this map was confidential. Totals for some states have been combined on the map, in order not to inadvertently disclose confidential data about particular mills. Caution—the X's show only sites of mill expansion which have been announced. Therefore, the total figures for certain states or groups of states may include expansion at mills which are not shown. In even some announced projects, the actual tonnage figures are confidential.

On this map is shown proposed expansion of 7,540 tons of pulp per day and 9,675 tons of paper per day. We discuss these plans in more detail—to the limited extent to which we have authorization—in the accompanying article. It will be noted that proposed expansion in Southern States totals 3,840 tons of pulp and 5,180 tons of paper.

The expansion projected here is for the 1946 to 1948 period and some of it already has been completed. About one-third of additional 1435 tons of pulp in Ontario, for example, was in production this past winter, at the new KVP and Marathon mills. And in the United States, Consolidated Water Power & Paper Corp., in Wisconsin, was one of the first companies in the industry to push through its expansion program. A few programs in the South are partially completed. But by far the greater part of additional tonnage shown on this map is still to be effected.

EXPANSION IN WESTERN U. S. AND CANADA

Proposed Additional Daily Output in Tons When Expansion Plans Are Completed



The pulp expansion shown by these figures will be sulfite and sulfate. Washington State is already the biggest pulp producing state in the United States with daily capacity of slightly over 5,000 tons. The additional 544 tons of pulp shown on this map will put that state far ahead of all rivals.

Paper production also will be much greater. This ranges from facial tissue in three mills to book paper in Oregon and with various kinds of sulfate papers and paperboard elsewhere.

These new projects, if all carried out, will increase paper production in the Far West by 1,945 tons per day. Their present capacity totals about 6,472 tons per day.

The expansion programs, except one in California, one in Montana, one in Washington, and two in British Columbia will be completed in 1947. Entirely new mills noted in this map are the projected sulfate mill of Weyerhaeuser Timber Co., the board mill of Simpson Logging Co. at Shelton, Wash., the Idaho-Montana Pulp & Paper Co. at Polson, Mont., in California, Fibreboard's new pulp and board at Antioch, and three mills in Canada. Other indicated expansion will be at existing mills.

These projects will call for at least 14 new machines, six others entirely rebuilt and a number of others speeded up.

The Montana sulfate mill, based on restricted stock sale, and a sulfite mill at Giscome, B. C., may be a long way off. But not included in these calculations is a rumored 500-ton board mill near Pittsburgh backed by several converters, still too uncertain to be listed. We are counting only the first 250-ton unit of the assured Celanese sulfite mill near Prince Rupert (it may be expanded to 400). The Bloedel, Stewart & Welch sulfate mill at Port Alberni is being completed this summer and there will be sulfite and sulfate expansion at other B. C. mills. Westminster is doubling paper output and Powell River is adding a newsprint machine.

two maps accompanying this article the break-down for states or combinations of states and Canadian provinces is shown in anticipated daily increased tonnages. X's mark location on these maps where some expansion is planned, but we hasten to warn that all expansion sites are not marked because some have not been publicly announced.

Our own independently-arrived-at figure for expansion in paper production of 3,124,500 tons in the United States is slightly higher than the estimate of 2,913,000 tons offered by E. W. Tinker, executive secretary of the American Paper & Pulp Association, on March 31 before the National Paper Trade Association, for the same 1946-48 period. Mr. Tinker said his figure was based on "existing plans." Our report is based on information gathered up to late April 1947 and apparently some "unofficial" plans enter in our calculations. However, we are pleased that our figures are so close to those gathered by the industry associations and this would seem to emphasize the authenticity for all of our figures—those for pulp as well as paper, for Canada as well as the U. S. and for the regional breakdowns which have not been made in various association expansion data.

Mr. Tinker said "if normal conditions prevail the trend line in consumption would indicate that this additional capacity will be required to meet public needs. However, there are many uncertainties in the situation among which is the world's best advertised pending recession."

His figures for the United States paper industry for the Jan. 1, 1946-Dec. 31, 1948 period, broken down by grades, are as follows:

Grade	*Annual Tonnage Increase*	*% increase in that Class.*
Book paper	582,000	32
Groundwood printing papers	248,000	37
Fine papers	126,000	11
Wrapping papers	424,000	13
Tissue paper	311,000	29
Newsprint	149,000	-17
Paperboard	1,205,000	12
Building papers	166,000	15

Following is a discussion of specific expansion programs in each of the major regions of the continent contributed by PULP & PAPER Industry editors from "on-the-spot."

Expansion in South

When new mills now in process of construction in the South go into production they will not be "way out in front" because of technological advancement they have been able to take advantage of but in many respects will be met strictly on the competitive line by older producing units that are busily engaged in modernization and expansion.

In some respects the expansion programs of established Southern mills overshadows the newly established units, according to PULP

SURVEY OF NEW U. S. PAPER-MAKING CAPACITY—1946-1948 (Issued Oct. 23, 1946, by American Paper & Pulp Assn. This is only slightly below PULP & PAPER Industry's own survey made six months later.)

Increases in Annual Capacity (in 1,000 tons)

Paper Grade	*1946*	*1947*	*1948*	*Total*
Book	229	218	109	556
Writing	74	47	5	126
Tissue	143	103	73	318
Kraft	140	164	2	306
Sulfite Wrap	9	58	51	118
Groundwood	35	36	3	74
Newsprint	.....	29	2	31
Asborbent	.....	.....	.....	.....
Specialty Paper and Board	21	58	.....	79
Paperboard and Building Papers	411	731	150	1,292
TOTAL	1,062	1,444	395	2,900

Increased capacity will be divided roughly into 1,600,000 tons of paper capacity and 1,400,000 tons of paperboard capacity. The additional tons in paperboard and building paper for 1947 and 1948 was broken down as follows:

Kraft Board	411,000
Heavy Paperboard	150,000
Fiberboard	2,000
Building Board and Felt	168,000
TOTAL	731,000
1948	
Heavy Paperboard	150,000

& PAPER Industry's own survey of this region. There are still more mills and more expansions in the offing.

Last year, on the basis of revelations an increase of 2,455 tons of pulp and 3,190 tons of paper per day was indicated as in prospect from Virginia to Texas. Today, with post-war plans almost completely exposed these figures can be revised to 3,840 tons of pulp and 5,180 tons of paper.

The first of the new machines installed in the South has started to roll, and before all of them contribute to the reams of paper produced there will be 20 more; and more than ten machines are being "modernized."

These prospects will be swelled by three additional major projects in the hush-hush stage now.

Additional electrical power generating units are now in process of installation of other mills not commited to expansion publicly.

The Southern pattern is exemplified by Southern Kraft Division of International Paper Co. In Feb., 1946, PULP & PAPER announced the investment of $2,000,000 in special hardwood pulping facilities and dedication of one of the three big Beloit machines for production of Chemfibre board at Georgetown and that machine started up last December. Also, there was some "deferred maintenance" including a half dozen 12 by 45-foot Fibre Making Process barking drums at various mills, and $1,050,000 spent at Mobile for recovery boiler, more power, and upping production by 75 tons per day.

Out of this "deferred maintenance" program the old Bastrop Pulp & Paper Co. mill, at Bastrop, La., drew a $450,000 CPA permit for a building addition; increase in digesters from six to ten; two of the big, efficient barking drums; and a new 150-ton-a-day Beloit paper machine, one of the South's fastest at 2,000 feet per minute. Since IP's lands as well as other owners thereabouts are redundant with hardwoods; the hardwoods have been proven up not just for currugations but for ink-taking propensities, it is presumed that the additional equipment will join the 240-ton per day production of hardwood pulp products.

At Camden, Ark., IP has a mill equipped with one 161-inch and two 211-inch Beloit fourdriners, with a pulp mill rated capacity of 355 tons. Here the company has installed a big, new wood barker, and two high-speed paper machine drives, respectively 1,200 H.P. and 1,500 H.P. each. Expansion here has been officially announced as 48,575 tons a year, which would be about 150-160 tons per day.

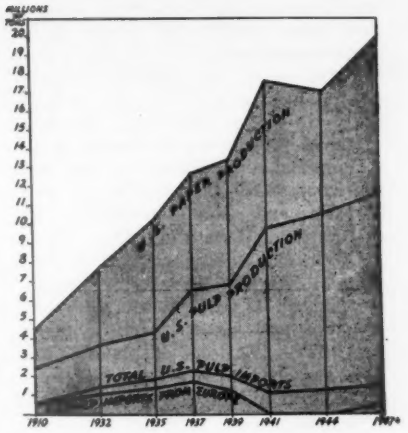
At another mill west of the Mississippi, Springhill, La., is quoted as receiving "plenty of improvements."

At Moss Point, Miss., there was installed a new barking drum and a digester. At Panama City, Fla., a comparable installation has been taking place.

During the war use of southern hardwoods in the industry became general. In some mills, a percentage of pulpwood was run in. This ultimately gave rise to special runs of hardwood and subsequent blending, than the straight run production of a paper from hardwood pulp resulted. This, however, has not been exclusive with International Paper. Innumerable tests were conducted on hardwood at Herty Laboratory for various companies in addition to work conducted within the mills themselves.

It may be noted the Southern Paperboard's (Robert Gair, Inc.) new mill at Savannah, Ga., will have digesters and cross-connections for flexible accommodation to hardwood pulping. Another prominent Southern mill produces "slick" paper from tupelo gum. The Gair mill should be in production next winter.

The development of Southern



THIS CHART shows the steady rise of U. S. pulp and paper production. The 1947 extensions here was according to the "Report on Postwar Paper and Paperboard" written by C. W. Housley when he was Coordinator of Statistics in the old Forest Products Bureau, in Washington, D. C. He predicted 20,070,000 tons of paper would be produced in 1947. For this year, he forecast 11,700,000 tons of pulp made in this country.

George H. Chidester, chief of pulp and paper division, U. S. Forest Products Laboratory, Madison, Wis., says by 1950 annual U. S. consumption of paper will reach 24,000,000 tons. (1945 U. S. consumption was 19,822,000 tons; imports, 2,775,000 tons; exports, 325,000 tons.)

It is very probable that the supply and demand picture for paper in 1947 will work out just as was forecast by Mr. Housley. For instance, paper production of about 21 or even 22 million tons is now being forecast, somewhat above his figure.

Also pulp imports of 500,000 tons from Europe and 1,000,000 tons from Canada for 1947 were predicted by Mr. Housley with a U. S. production of 11,700,000 tons. It looks like he may have hit a few nails just about smack on their respective heads, although in one category—U. S. pulp production—the output is running somewhat behind his forecast made in December, 1944.

hardwoods as a source of pulp for paper opens a vast door for raw material since slightly more than 50% of southern forest acreages is occupied by these species, and every mill that holds lands in fee simply has its own supply of hardwoods heretofore held negligible in value.

The expansion of mills in the Southern fields involve some interesting technological advancement. In addition to the 2,000-foot per minute IP machine at Bastrop, La., there will be one of similar speed at Southern fields involves some interesting reputedly the widest and fastest of its kind in the United States.

One of the first big Southern mills to complete a postwar expansion and modernization was Champion's Canton, N. C., mill where one of the first new fine paper machines, a 245-inch Pusey & Jones, went into production Jan. 31, 1947, increasing paper grade output by 50%. Re-

building of a board machine expanded board output 80% these daily total tonnages for mill are 400 paper and 180 board. A complete change-over to sulfate was effected, as well as multi-stage bleaching. Moving closer to its sources of wood supply, Champion is building up its big Southern mills at both Canton and Houston, but some production in the north will be reduced.

Union Bag & Paper Corp. at Savannah has made good progress in stepping up its pulp production about 200 tons and a new machine there will make 160 tons of paper. The new modern Beloit all-purpose machine with dual couch arrangement, first put in at Georgetown, was going in next at West Virginia Pulp & Paper Co.'s Charleston, S. C., mill and then at North Carolina Pulp & Paper Co.'s Plymouth mill. Ecusta Paper Corp., near Brevard, N. C., branching out from cigaret paper to air mail and specialties, is also adding capacity for that purpose.

As this issue went to press, steel work was up and progress being made at Hudson's new 150-ton Palatka, Fla., mill. Likewise, an early achievement is the new output of 190 tons of board at Container Corp., in Fernandina, Fla. The big St. Regis-Jim Allen joint project north of Pensacola was also rolling along. Here improvements have been made at Florida Pulp & Paper Co., bought outright by St. Regis, and across the road, the new Alabama Pulp & Paper Co. will add 250 tons of paper and board with one of the first new modern Black-Clawson machines, and there will be a bag plant. When the new mill is built it will be run by Jim Allen and his staff. Two new Roberts grinders and other improvements are adding 175 tons a day at Mobile Paper Co.

The Mead Corp.'s subsidiary, Macon Kraft Corp., at Macon, Ga., Kimberly-Clark Corp.'s cellulose wadding plant at Memphis, projected new mills at Bainbridge, Ga., and at Childersburg, Ala., the latter for newsprint, are among announced projects. But all the way to Southland Paper Mills, where another newsprint machine will add 170 tons a day, added production is projected.

In building and insulating board there is great activity in the South, with Celotex expanding substantially in Louisiana, Armstrong Cork building a new plant at Macon, U. S. Gypsum building at Greenville, Miss., a new $7,000,000 wallboard plant at New Iberia, La., etc.

Improvements in the South are not related to size of mills, but is spread almost uniformly throughout the Southern industry.

A most vital aspect of change is that pulp that might otherwise be offered for sale is being converted in the South.

A general trend in the South is the increasing of bleaching equipment. Many in the South are convinced that a plain unbleached kraft material is passe.

Another very interesting development is the stepping-up of the South's production into the quality level. Just as the common industry is putting in bag machines instead of offering the paper for conversion, so certain mills are offering quality paper products instead of those on the lower level.

The bulk of the Southern production expansion will be felt in the field by the end of 1948. Some of it is coming in a limited way within the next three months, with perhaps 50% for the end of 1947. New mills will take, in the main, 60 days longer than originally scheduled. There have been delays known to and understood by everyone within the industry.

East and Middle West U. S.

In the Eastern and Middle Western U. S. there was only moderate change in the projected expansion as pictured in the 1946 North American Review Number.

A re-survey of the New England, Middle Atlantic, and Middle West areas indicates that a large part of the new tonnage indicated in these pages last year is either a reality or moving toward the final stages of completion which will make it a reality.

However, the expansion is not yet entirely static, even though our survey last year attempted to include 1948. There is some additional tonnage to be added, as shown on the map herewith.

The general trend of expansion in this area is based on hardwoods and new sulfate cooking processes, and on groundwood process taking advantage of improved bleaching techniques.

Three definite trends are still visible in projecting toward 1950: the efforts to capitalize on popularity of tissue uses, increase in paperboard to meet new packaging needs; and, possibly to a lesser extent than last year, new and converted book paper machines with machine coating. By "lesser extent" we mean that many postwar plans in this category are now complete or nearly so. And it would seem that magazine sales are in the leveling stage, although there are compensating factors coming up in both fields. The GI education program, the rising foreign market for books and magazines, and the still rising U. S. hunger for facts in a complex world, lead to caution in assuming that book paper expansion has crystalized. Too, things like "video" newspapers for the home are always around the corner.

In the eastern section, perhaps more than elsewhere in the U. S., there have been delays in expansion due to difficulties in obtaining equipment, and uncertainty about supplies. Some of the postponements are indefinite as to time, and one or two may be abandoned—unless there is a correction of the inflationary rise in cost of new mills.

Consolidated Water Power & Paper Corp., in Wisconsin, was one of the first big companies on the continent to complete a postwar expansion. It added a machine at Biron and converted two new machines to book paper at Wisconsin River, a newly acquired division, altogether increasing its machine coated paper by probably about 50%.

Hammermill Paper Co. is carrying out an elaborate and mony-faceted expansion and improvement program including a new Rice, Barton machine at Erie, Pa., St. Regis in its newly acquired Bryant Division in Kalamazoo, is also extending coated production.

Kimberly-Clark Corp., building a new kraft pulp mill in Shreiber, Ont., and a tissue plant at Memphis, has been carrying out a program close to the home base with two new high speed coated paper machines at Niagara, Wis., and a new creped wadding machine at Lakeview in addition to the one put in at Kapuskasing.

Marathon Corp., who's new pulp mill is producing in Canada, is adding a new 136-inch Yankee Fourdrinier at Menominee, Mich., for tissue and a carton plant at Menasha, Wis.

Rhinelander Paper Co. is adding another large glassine papermaking unit as part of a $4,000,000 program.

Chillicothe Paper Co. in Ohio will step up production when it gets delivery on a new Rice Barton 175-in. Fourdrinier by 60% and modern power plants at both Chillicothe and The Sorg Paper Co. are making possible greater production. A new stream-lined Moraine Paper Co., being built at West Carrollton, O., by American Envelope marks the first new addition of this type of mill in Ohio in over a generation.

Among the producers of new tonnage in tissue predicted here last year is Personal Products, Milltown, New Jersey. Its two high-speed

142-inch Yankee fourdriniers from Bagley & Sewall are now in production.

In the board field, Gibraltar Corrugated Paper Company, North Bergen, New Jersey, went up in record time and is now producing.

Brown Company, Berlin, New Hampshire, is coming to completion of its new sulfate mill to manufacture 200 tons daily and a Rice, Barton machine is being added.

At the long idle International mill at Fort Edwards, N. Y., Scott Paper Company is operating the machines installed there late in 1945 and early last year. Another important eastern development that has come along as planned is the Odgensburg, N. Y., operation of the B-F-D Company which is producing over 200 tons of pulp, both for the Plattsburg sulfite mill, and also for machines at Ogdensburg.

Also in the Glens Falls area, International at Palmer, installing the Consolidated coating process, is substantially increasing production of bleached groundwood.

Curtis Publishing Co., and New York & Pennsylvania Co. have doubled the output at Lock Haven, Penn., as planned, with the addition of a new machine running 125 tons daily. These and other tonnage additions, mentioned last year, testify to the solidity of the 1946 North American Review Number Survey.

Since then other improvements have been noted which may be expected to add or insure tonnage. The program at the Otter River, Mass., mill of Seaman Paper Co., including new beaters, pulper, and paper machinery ventilating system, is going forward. Hopper Paper Co., Reading, Pa., is another small mill which has entered orders for capital equipment, including a super calender. At last reports, work was going forward for the glassine conversion of Sonoco Products Co., Rockingham, N. C. Byron Weston Co., Dalton, Mass., is modernizing paper machines and installing new finishing equipment, which will bring the mill to greater speed and capacity. A third paper machine—154-in.—is planned for Velvet Tissue Products, Fulton, N. Y.

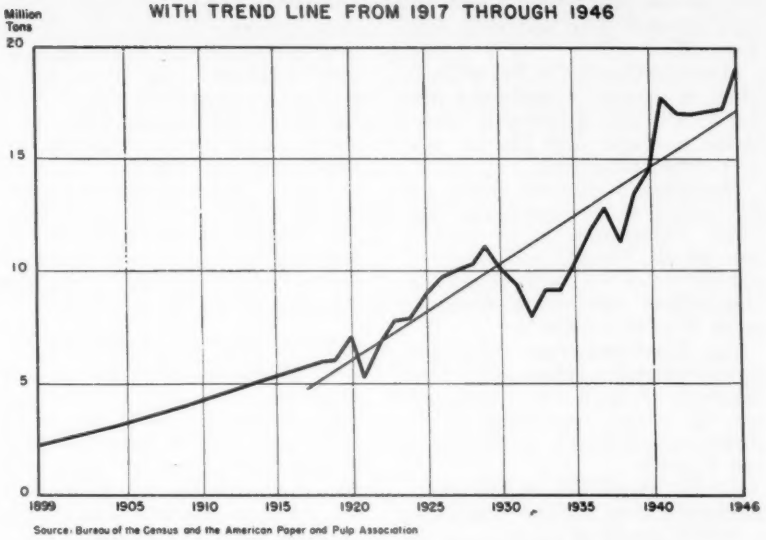
Late this year the new glassine and greaseproof machine is expected to be in operation at Riegel Paper Co.'s mill at Milford, N. J.

Construction is going forward on the new $1,000,000 tissue mill of National Cellulose Corp., near Baldwinville, N. Y. U. S. Gypsum Company will soon have its new combination felt and paper machine in the Jersey area. And the Deferiet, N. Y., mill of St. Regis jumped from 80,000 to 110,000 tons annually, an increase of 37½% with the installation of a 206-inch machine. Eastman Kodak's paper mill at Rochester, N. Y., is adding a machine. At Buffalo, Hinde & Dauch has a $400,000 program.

Such "samplings" from the eastern seaboard illustrate that the industry in that area is still in a state of flux, and on the optimistic side. There are not likely, it is believed, to be many new mills in this section. But there may well be sales of small New England mills, pinched in the way of woodpulp or waste.

It is known that several can be bought, although they are not advertising—and sales of this nature, usually to large and well-integrated companies, result in improvements and sometimes in added tonnage. This happened in the instance of the purchase of Amoskeag Paper Mills, Manchester, N. H., by the Paper Corp. of America, New York; and

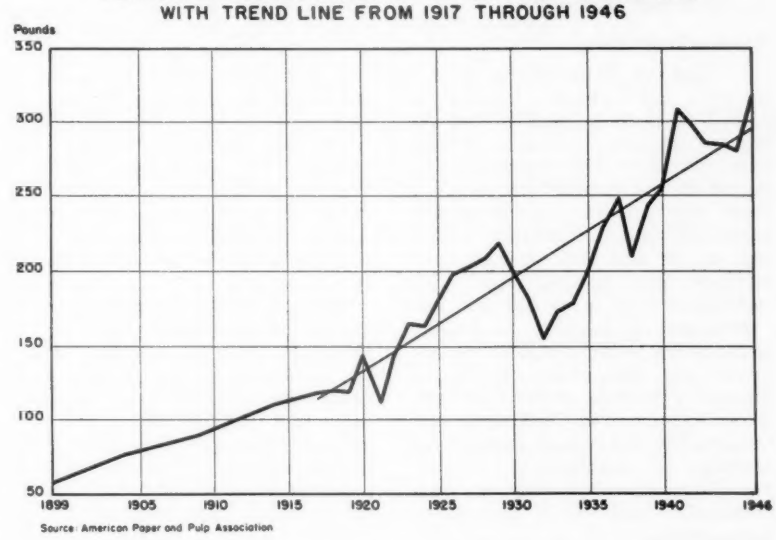
PRODUCTION OF PAPER AND PAPERBOARD
WITH TREND LINE FROM 1917 THROUGH 1946



Source: Bureau of the Census and the American Paper and Pulp Association

LONG TERM TRENDS IN U. S. PAPER PRODUCTION AND PER CAPITA CONSUMPTION (As Shown in These Charts) REVEALS STEADILY INCREASING MARKET. The long term, steady growth of the U. S. paper industry is clearly shown. The long term trends (the light straight lines) reflects increased population and per capata consumption. According to the American Pulp and Paper Assn., overall average annual growth in production since 1914 has been 390,000 tons per year. This is 5.15 index points annually if 1914 production is taken as 100. In 1946, actual production reached 19,179,355 tons and consumption per capita rose to 319 1/3 tons—both new records.

PER CAPITA CONSUMPTION OF PAPER AND PAPERBOARD
WITH TREND LINE FROM 1917 THROUGH 1946



Source: American Paper and Pulp Association

by the time this article appears it is expected that Paper Corp. will have purchased an additional eastern mill.

Michigan Carton Co., Battle Creek, Mich., is increasing production from 220 to 450 tons a day with a new Beloit machine and Shartle pulp preparation equipment.

Minnesota & Ontario Paper Co. has added an Insulite board machine, adding 40% to its production of this board, and two new coating machines and plants for bleaching of kraft and groundwood pulps head its expansion.

The Northwest Paper Co., Nekoosa-Edwards Paper Co., and Thilmany Pulp & Paper Co., are making various improvements, including bleach plants at Northwest and Nekoosa.

Blandin Paper Co., in Minnesota, one of the mills shifting from news to higher grades of paper, is to increase its groundwood pulp output.

In Kalamazoo, Sutherland Paper Co., is increasing its paperboard production by 50 tons per day and making improvements and expanding in its conversion plant.

Speed-ups at several Michigan mills are being carried out. In Kalamazoo, National Gypsum is increasing by 15 tons this year.

Alaska Expansion

Use of Douglas fir second growth and salvage logging of logged-off lands in the Far West are highly important factors behind expansion there. One big mill is expected to use entirely fir, which a short time ago was considered unsuited for pulp, and another will be half on fir and half on traditional hemlock and spruce. The kraft techniques have made this possible.

Pressure for moving to Alaska, as far as the paper companies themselves are concerned, eased up noticeably because of this discovery of new resources in Washington and Oregon. Fir and salvage logging are capable of establishing several operations now running at high production rates on a permanent future basis.

The pressure for Alaska production, however, persists from government and newspaper interests. Because of this high pressure propaganda and possibly even more tangible pressure than even propaganda, there was a possibility that an Alaska project might be started this year. Secretary of Interior Krug said big interests were near to consummating when this issue went to press, but he had been making similar statements for six months.

Among problems any firm faced which wanted to start an Alaska mill today were: (1) Highest cost mill anywhere in world—probably over $30,000,000; (2) unsettled shipping facilities with prospects of contract controversy for the last six months of this year between operators and 22 maritime unions; (3) Department of Interior sponsored aboriginal Indian claims of ownership to best timber in Alaska; (4) various government controls over timber use and manufacturing, and (5) probable need for building a "company town."

Other Pacific Coast Expansion

Meanwhile, in the Pacific Coast states, the Crown Zellerbach Corp. operations are in the throes of modernization or expansion. The Camas, Wash. plant has been producing paper at the rate of 460 tons per day. Since the new facial tissue machine went into production last March production has been raised to 480 tons. Producing capacity will be raised an additional 125 tons per day in the summer of 1948, when Number 15 machine, an all-purpose unit with all the latest improvements, gets into production.

The West Linn, Ore., mill is adding one machine and rebuilding an old machine for machine coated paper to supply Time, Inc., and Curtis Publishing Co. Two A2 printing and phone directory machines are being speeded up. The first of two steps for increasing production from the toweling machine has already been made and is now in production. This expansion program, resulting in an increase of approximately 110 tons of paper per day, is expected to be concluded during the fall of 1947.

Western Waxed Paper Co., Division of Crown Zellerbach Corp., in Portland, Ore., has nearly completed a new building for gum tape plant, new machine room and shop are under construction, and a new office is being built in a half-million dollar expansion which will increase production "considerably." Out in San Leandro, Calif., Western Waxed has acquired 21 acres for a $750,000 plant and Emeryville equipment will be moved there.

At the Port Townsend, Wash., kraft mill of Crown Zellerbach Corp., the woodmill and chipping plant is being rebuilt to handle a greater variety of wood thus facilitating the processing of farmer wood, and the smaller types of wood recovered from re-logging operations. The mill is also in the midst of major replacements of washers and evaporators. A new Swenson-Nyman washer will be installed.

The new 200-ton-per-day kraft pulp mill being built by Weyerhaeuser Timber Co., at Longview, Wash., and a new magnesia base recovery plant there for the existing sulfite mill, which will use magnesia base instead of calcium in cooking, were both making headway and should be completed by the latter part of this year.

Puget Sound Pulp & Timber Co. was starting a new 30-ton board mill in Bellingham, Wash., and Standard Carton in Tacoma, now owned by Container Corp., has expanded. Simpson Logging Co. started up its 50-ton a day board mill in Shelton, Wash., but was not yet making the high quality product for which it is intended and awaited further supplies to effect this. In West Tacoma, a 50-ton newsprint mill was due to get started as this issue went to press, with financial backing of a group of Pacific Coast newspapers.

The St. Regis Paper Co.'s Kraft Pulp Division at Tacoma, Wash., was to become a wholly integrated operation, with a 300-ton paper mill an a bag plant on the program.

Spaulding Pulp & Paper Co., in Newberg, Ore., was sold to a group of Midwest paper mills and there were possible plans for expansion here, and about the same time Hawley Pulp & Paper Co. was sold to owners of the Claremont Paper Co. of New Hampshire.

Pacific Paperboard Co., in Longview, already has effected some additional tonnage and anticipated a further 40 tons per day increase in solid manila pulp board.

At Bellingham, Wash., increased tissue was achieved from 21 to 30 tons a day by modernization of a machine at Pacific Coast Paper Mills of Washington. The trend toward greater conversion of paper in the West was exemplified in the rapid construction and putting into operation of the new Mill Print, Inc., plant at Vancouver, Wash.

At last accounts there was to be nearly a 20% increase in Pacific Coast paperboard production, but even this was far short of the requirements for board. A large part of these requirements were still being shipped in from the east. Even six additional board machines were considerably short of meeting the demand that has grown fantastically hand in hand with the movement of manufacturing enterprises to the west coast which must have packaging materials. Among these were three drug firms which moved from the East, taking up new operations bases in California; General Mills, also joining the westward trek, and others.

There were rumors that several board users planned a new 500-ton board mill in the San Joaquin Valley, but this was in so uncertain a state at publication time, that we have omitted it entirely from calculations in this article.

The first modern pulp mill in California, however, is definitely planned on the South bank of the San Joaquin River about two miles east of Antioch, and already plans are being substantially carried forward by Fibreboard Products, Inc., the builders. This will be Fibreboard's second pulp mill, their other one being at Port Angeles. Here, briefly are some parts of a $24,,000,-000 program being carried out by Fibreboard:

New San Joaquin Division—this to be pulp mill, board mill and converting plant, with construction starting in second quarter of 1947 and two units being completed in 1948. Units are a complete semi-kraft .009 mill and bleached kraft pulp and board mill as well as carton converting department.

Antioch Division — Power plant additions will be completed in 1947; one of three board machines will be rebuilt and enlarged in 1948; large additions to carton and corrugating plant have been completed.

Stockton Division—New turbine installed, new boiler to be available in 1947; also additional carton making and litho equipment.

The Los Angeles Divisions: Vernon: Complete paper coating system installed; more acreage acquired and additions planned. Sunset: General improvements. South Gate: Additional equipment on order.

Port Angeles, Wash—Changeover from hogged fuel to oil furnaces completed. Sumner, Wash.—Additional equipment and new buildings. Portland, Ore.—Entirely new carton plant to be finished in 1947 increasing output 50%.

Southern California's paper industry has been greatly expanded since the end of war, several million dollars being invested in new plants and modernization programs of existing mills. Pioneer Division, The Flintkote Co. spent more than $1,-000,000 to increase production by 20,000 tons annually.

With the initial running of its new No. 3 tissue and fruit wrap machine, and modernization and replacement of worn equipment elsewhere in the plant, Fernstrom Paper Mills in Pomona, Calif., expects to step up production to practically double its 1946 output of 14,000 tons annually.

Angelus Paperbox Co., one of the country's oldest paperbox making concerns in Southern California launched into paper board manufacture and started rolling on two units of a new mill and factory in south Los Angeles. Ultimate plans call for a four-part operation; paperboard mill, folding and set-up box depts., and a corrugating unit. Each is scheduled for a separate building, but all are planned to provide straight-line production flow from raw material to finished product.

The paperboard mill occupies a stucco-concrete building 85′ by 450′. The single machine is a 60-dryer Black-Clawson with provisions for 46 more.

Fibreboard in Los Angeles instal-

(Please turn to Page 168)

The expansion data below, developed by the U. S. Pulp Producers Association, is strikingly similar to the figures arrived at independently by PULP & PAPER Industry's own survey. (Compare with data on page 60—note that the figures below are for annual capacity. It is reasonable to estimate about an average of 300 actual working days in a year, after allowances for vacation shutdowns, etc.).

U. S. WOOD PULP CAPACITY

UNITED STATES PULP PRODUCERS ASSOCIATION

TABLE I — Annual Wood Pulp Capacity by Grades
(In tons of 2000 pounds, air dry weight)

	1939	1946	1947	1948
Total Sulphite	2,664,604	2,907,724	2,841,721	2,855,221
Maximum Bleaching Capacity	1,686,439*	1,953,912	1,924,940	1,942,815
Total Sulphate	5,681,989	5,377,079	5,703,183	6,466,353
Maximum Bleaching Capacity	511,370*	1,266,035	1,557,263	1,559,509
Soda	664,950	493,879	519,959	538,424
Semichemical and Chemfibre	154,280	353,555	536,743	577,574
Groundwood	2,431,309**	2,330,260	2,446,116	2,579,716
Defibrated and Exploded	**	667,667	845,069	930,124
Asplund and Exploded	(Not Available)		601,769	671,074
Chemipulp			243,300	259,050
Screenings	(Included in grade totals)		74,029	75,707
TOTAL	9,597,132	12,130,164	12,966,820	14,023,119

* Data for 1939 were reported on the basis of "bleaching capacity normally used", rather than maximum bleaching capacity as in later surveys.

** First defibrators in United States were installed experimentally in 1937 but actual use did not begin until 1939. Small defibrated Capacity for 1939 not available; exploded pulp capacity included with groundwood capacity in 1939.

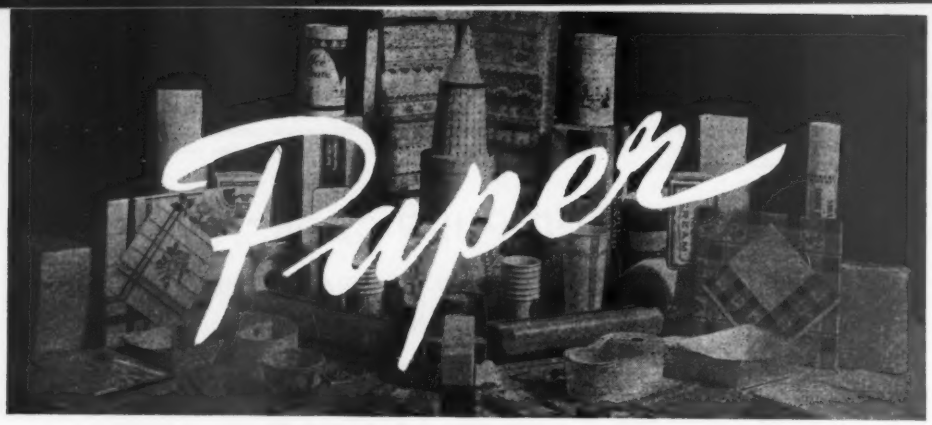
TABLE II — Annual Total Wood Pulp Capacity by Regions
(In tons of 2000 pounds, air dry weight)

	1939	1946	1947	1948
New England	1,487,052	1,592,089	1,612,085	1,667,964
Middle Atlantic	1,105,441	1,038,895	1,165,110	1,172,155
Lake	1,416,495	1,725,733	1,831,103	1,894,650
Pacific	1,781,475	2,057,974	2,172,099	2,354,997
South	3,806,671	5,715,475	6,188,423	6,953,353
TOTAL	9,597,132	12,130,164	12,966,820	14,023,119

These statistics cover all mills presently producing wood pulp in the United States, and the productive facilities of the following mills now under construction:

Company	Location of Mill
Alabama Pulp & Paper Company	Cantonment, Florida
Fibreboard Products, Inc.	Antioch, California
Hudson Pulp & Paper Corporation	Palatka, Florida
Macon Kraft Corporation	Macon, Georgia
Simpson Logging Company	Shelton, Washington
Southern Johns-Manville Products Corp.	Natchez, Mississippi
Southern Paperboard Corporation	Port Wentworth, Georgia
West Tacoma Newsprint Company	West Tacoma, Washington
Weyerhaeuser Timber Company	Longview, Washington

Capacity data for projected pulp mill construction in Alabama, Idaho and Montana are not included in these tabulations.



ALL RECORDS FALL —IDEAS FOR NEW USES MAY TAKE UP ANY FUTURE SLACK

UNITED STATES, Canadian and Newfoundland paper mills smashed all previous production records in a big way in 1946.

Last year they produced a grand total of between 24 and 25 million tons of paper and paperboard. They made at least 2,500,000 tons more than in any previous year.

North American paper production north of the Rio Grande for 1946 was approximately 24,730,000 tons. We have actual figures for all paper output in the U. S. and for all Canadian newsprint production. To arrive at our estimate we added an estimate of other paper output in Canada and Newfoundland of about 1,500,000 tons. Statistics on total paper production are available in Canada and Newfoundland only for years up to and including 1945.

In this section of last year's North American Review Number, we stated:

"A straw in the wind—U. S. paper output for March 1946 was 1,639,000 tons—biggest month since 1942. If that becomes average for the year, 1946 production in U. S. will reach 19,670,000 tons, about two million above 1941's record year."

Actual 1946 production was 19,179,355 tons, according to Uncle Sam. We came close enough to try again:

The U. S. industry broke all previous records by making 5,176,832 tons of paper in the first quarter of 1946. This means a 20,700,000-ton record year for 1947 if the three remaining quarters are on a par.

Officially, the U. S. census bureau places all U. S. paper production in 1946 at 19,179,355 tons. The Canadian Newsprint Association announced that 1946 production of its member mills was 4,143,392. We have made the estimate for additional paper in line with previous years allowing also for some expansion in line with general 1946 trends.

Total Paper Production of U. S., Canada and Newfoundland

Year	*Tons*
1946	24,730,000
1945	21,965,000
1944	21,499,980
1943	21,252,032
1942	21,590,629
1941	22,637,141
1940	19,153,123
1939	17,410,144

The United States broke many of its own all-time paper and paperboard records in 1946. Here are a few:

Total production .....19,179,355 tons
Total consumption.....22,411,476 tons
Imports ..... 3,625,422 tons.

UNITED STATES

Paper and Woodpulp Production and Consumption (latter for paper only—excluding rayon, plastics, etc.) Consumption of Domestic and Imported Pulpwood and Total Pulpwood Consumption

	PAPER		WOODPULP		CONSUMPTION OF PULPWOOD		
Year—	Production (tons)	Consumption (tons)	Production (tons)	Consumption (for paper only) (tons)	Domestic (cords)	Imported (cords)	Total (cords)
1899	2,167,593	2,158,000	1,179,525	1,216,254	1,617,093	369,217	1,986,310
1904	3,106,696	3,049,824	1,921,768	2,091,006	2,477,099	573,618	3,050,717
1909	4,216,708	4,224,000	2,495,523	2,856,593	3,207,653	793,954	4,001,607
1914	5,270,047	5,496,164	2,893,150	3,556,377	3,641,063	829,700	4,470,763
1919	6,190,361	6,479,490	3,517,952	4,113,911	4,445,817	1,032,015	5,477,832
1920	7,334,614	7,846,827	3,821,704	4,696,035	5,014,513	1,099,559	6,114,072
1921	5,356,317	6,053,915	2,875,601	3,544,218	3,740,406	816,773	4,557,179
1923	8,029,482	9,339,573	3,788,672	5,149,695	4,636,789	1,236,081	5,872,870
1925	9,182,204	10,590,090	3,962,217	5,590,304	5,005,445	1,088,376	6,093,821
1927	10,002,070	11,915,233	4,313,403	5,960,865	5,526,889	1,224,046	6,750,935
1929	11,140,235	13,347,925	4,862,885	6,704,341	6,411,566	1,233,445	7,645,011
1931	9,381,840	11,403,850	4,409,344	6,005,718	5,896,446	826,320	6,722,766
1932	7,997,872	9,733,764	3,760,267	5,083,446	4,891,424	741,699	5,633,123
1934	9,186,266	11,185,682	4,436,128	5,969,633	5,822,681	973,978	6,796,659
1935	10,506,195	12,490,886	4,925,669	6,877,869	6,590,942	1,037,332	7,628,274
1936	11,670,000	14,546,046	5,695,219	7,420,829	7,506,156	1,209,760	8,715,916
1937	12,600,000	15,798,362	6,572,918	8,692,489	8,870,932	1,522,868	10,393,800
1938	11,327,000	13,488,300	5,933,560	7,975,000	7,900,053	1,293,938	9,193,991
1939	13,509,642	15,930,349	6,993,334	9,058,415	9,685,592	1,130,874	10,816,466
1940	14,483,709	16,620,632	8,959,559	9,781,739	12,564,180	1,435,820	13,742,958
1941	17,762,365	20,391,412	10,375,422	11,363,600	15,400,000	1,292,640†	16,692,640
1942	17,083,862	19,608,862	10,783,430	11,038,020	15,972,000	1,232,000	17,204,000
1943	17,035,688	19,560,688	9,680,462	10,635,320	15,000,000	1,718,000	16,718,000
1944	17,182,804	19,485,887	10,108,443	10,502,204	14,819,000	1,650,000	16,469,000
1945	17,370,965	19,665,487	10,167,200	10,825,412	15,315,000	1,699,000	17,014,000
1946	19,179,355	22,411,476	10,605,225	12,088,500	16,089,560	1,728,000	17,817,560

Source: Bureau of the Census, United States Forest Service and A. P. & P. A. Bureau Foreign and Domestic Commerce, U. S. Pulp Producers Association (for pulp production only).

†Available for nine months of 1941 only. Other 1941 figures estimated for 12 months.

Note: Pulp consumption for all purposes—paper, rayon, plastics, etc.—was 11,362,600 tons in 1945 and 11,066,204 tons in 1944.

TOTAL PAPER PRODUCTION IN UNITED STATES

(Tons of 2,000 lbs.)

	1940	1942	1943	1944	1945	1946
Newsprint	1,056,304	967,211	811,309	720,752	725,267	775,042
Book	1,655,423	1,704,029	1,592,878	1,435,785	1,494,436	1,918,655
Groundwood	550,453	610,168	585,673	593,094	636,506	771,178
Fine	735,753	1,055,475	1,020,601	974,372	1,010,064	1,143,257
Wrapping (Coarse)	2,500,818	2,713,738	2,501,637	2,559,447	2,642,721	2,715,131
Tissue	733,894	170,653	162,766	157,540	157,384	181,606
Sanitary	----------	811,343	806,023	807,893	823,889	839,939
Absorbent	129,410	64,530	88,254	90,107	88,849	98,943
Building Papers	682,460	1,001,383	877,582	881,246	889,464	1,011,398
Other Paper	60,120	16,148	129	----------	----------	----------
Container Board	3,434,834	3,755,438	4,087,972	4,228,304	4,130,424	4,303,228
Folding Boxboard	1,416,452	1,711,795	2,015,640	2,116,152	2,266,861	2,668,815
Setup Boxboard	898,549	996,688	829,102	750,313	718,972	594,451
Tube Stock	----------	164,785	307,308	458,107	361,034	----------
Building Boards	179,443	1,052,054	1,063,851	1,087,467	1,121,824	1,243,436
Other Boards	449,796	288,424	284,963	322,225	306,513	914,276
TOTAL	14,483,709	17,083,862	17,035,688	17,182,804	17,374,208	19,179,355

Source: Bureau of Census, U. S. Department of Commerce.

Per capita consumption ..... 319.3 lbs.
Consumption—wood pulp ..... 12,088,500 tons
Consumption—waste paper ..... 7,296,000 tons

That total production figure was far above 17,374,208 tons in 1945 and the previous all-time record of 17,762,365 tons in 1941. The consumption of paper and board in the U. S. was also a big jump over the 19,822,433 figure of 1945 and the record of 20,391,412 in 1941. U. S. paper consumption per capita was 305 lbs. in 1941 and only 248 lbs. in 1937.

Following is a survey by PULP & PAPER Industry of some factors and trends that will have an important bearing on the future of the paper industry:

A Back-Log of Ideas For New Uses of Paper

One of the most interesting future factors in the paper industry today is the back-log of ideas—ideas for new uses of paper—which have been held in abeyance because of pulp and paper shortages. It is a factor which the analyses of the investment services, looking coldly at expansion figures against current and past demand, overlook entirely. Yet it seems entirely probable that new and as-yet-unheard-of uses for paper might well take up any slack in demand that would be caused by a long range decline in the businesses of old customers.

For example, the New York office of PULP & PAPER Industry received a call recently from a man who had bona fide orders for a million small booklets of tissue impregnated with a medicinal agent. It was an idea apparently jumped at by chain drug stores and doctors' offices. But he could not find the paper for his venture, and at last reports was trying the cigarette tissue mills—and with probably narrow chance of supply in that relatively small branch of the industry.

This is but one example in literally hundreds. Not all these ideas, not even a majority of them, will bear fruit. But it takes only a few to up paper demand thousands of tons, as witness what happened in the tissue industry after the development of sanitary products.

One of the brightest spotlights on the future of the paper industry is still in the packaging field. Every year more and more paper and paperboard companies take part in the annual Packaging Institute Show at Atlantic City, and it is readily apparent that the industry is well abreast of packaging developments in all industries, but particularly in the food industry. Frozen food plants are literally mushrooming, and while late in 1946 and early 1947 there began a weeding out of marginal producers there is no doubt of the market offered in this field. New frozen food plants in Whatcom County, Wash., for example, are the specific reasons for the Puget Sound Pulp & Timber Company's new board mill at Bellingham, Wash. They do not expect to see the present programmed production go outside the county.

Board expansion in California is in a similar vein, and the new ultra-modern board mill of Gibraltar Corrugated Paper, Inc., in New Jersey is an example of a similar movement in the eastern seaboard.

Those bearish on the prospects for the food market forget the wide variety of foods now packed in paper. The demand for milk containers, for example, is doubling.

Pre-Packaging

"Pre-packaging" is accounting for new demands on all types of paper from wrap to glassine and

U. S. and Canada Make 77% of World's Paper

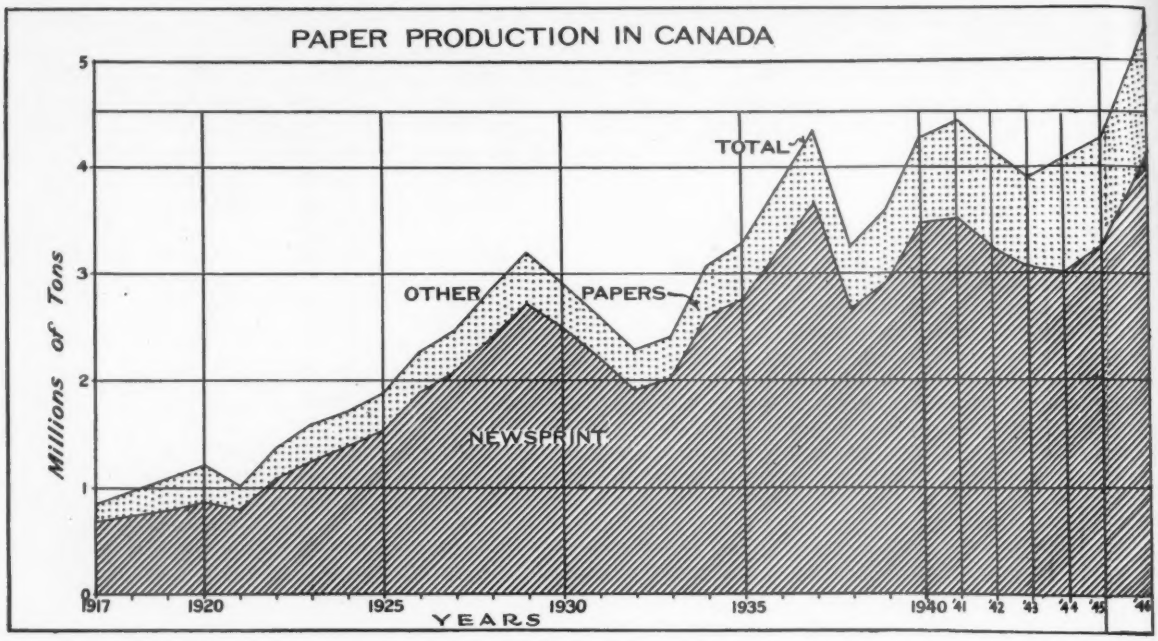
Total 1946 world production of paper and paperboard has been estimated at 32,552,914 tons by the APPA. This exceeded by a slight margin the world production of 31,863,107 tons in the boom year of 1937.

But major increases in production in the Western Hemisphere were offset by reductions of about 50% in Europe and elsewhere. The increase in production in the U. S. alone has almost offset the decrease in Europe. The increase in Canadian production more than offset the rest of the European deficit.

The United States is now making 59% of the world total as against 40.3% in 1937. The percentages follow:

	1937 % of Total	*1946 % of Total*	*% Shift*
United States	40.3	59.0	+18.7
Canada-Newf'land	14.7	18.1	+ 3.4
Europe	39.6	18.6	—21.0
Latin America	.9	1.6	+ .7
Other Countries	4.5	2.7	— 1.8
TOTAL	100.0	100.0	

During the war 22.8% of the prewar world production of paper and paperboard shifted to the Western Hemisphere. The principal shift was away from Europe to North America. U. S. and Canada now make 77.1% of world production as against 55% in 1937.



CANADIAN PAPER PRODUCTION figures for latest available years, officially, were: Total paper—4,359,576 tons in 1945, 4,044,376 in 1944, 3,882,262 tons in 1943, 4,164,565 in 1942 and 4,449,598 in 1941. Total newsprint—4,143,392 tons in 1946, 3.324,039 in 1945, 3,039,783 in 1944. Unofficial figures for 1946 showed total paper production increased to about 5,300,000 tons.

CANADIAN PAPER PRODUCTION (Selected Years)

	Newsprint		Total Paper	
	Tons	$ Value	Tons	$ Value
1917	689,847	38,868,084	853,689	58,750,341
1922	1,081,364	75,971,327	1,366,815	106,260,078
1929	2,725,331	150,800,157	3,197,149	192,989,252
1932	1,919,205	85,539,852	2,299,767	114,115,570
1939	2,926,597	120,858,583	3,600,502	170,776,062
1940	3,503,801	158,447,311	4,319,414	225,836,809
1941	3,519,733	158,925,310	4,524,776	241,450,292
1942	3,257,180	147,074,109	4,231,767	230,269,512
1943	3,046,442	154,290,163	3,966,344	235,362,958
1944	3,039,783	165,655,165	4,044,376	255,545,841
1945	3,324,039	189,023,736	4,359,576	282,837,614
1946 *	4,143,392	———	5,300,000	———

Dominion Bureau of Statistics.
*1945 figures from News Print Service Bureau; include estimate for total paper.

parchment and transparent right through to board. "Pre-Packaging" began years ago when grocers stopped selling oatmeal from the barrel, but in recent years it has extended to many other products and other fields. Best known in the food and drug field, where even tomatoes are packaged at the packing plant and pumice-stone comes in a board package, it is reaching into other quarters. Household goods and furniture are packaged at the factory for the customer, saving time and money for the retailer. The idea of "pre-packaging" is changing the methods of many an industry—fruit and vegetable marketers, for example, are packaging produce at central points to compete with frozen foods, and here again paper is the answer.

Many new uses for paper came out of war necessity, and paper mill laboratories have developed new grades for particular uses—paper resistant to humidity changes, transparent wrappings resistant to ultraviolet light, lacquered papers, extremely moisture resistant, resin impregnates of high wet and dry strength, and a host of laminates. Concerned as it has been with immediate demand for almost seven years, the paper industry has yet to show that it is equipped to research and market in new industries and swiftly changing industries. True, behind it are some notable examples of this ability, such as the development of the multiwall bag for cement and potatoes.

But many of the paper industry's developments were the results of necessity imposed by war shortages. Many war-developed paper products were, in essence, substitutes. That they were adequate substitutes, sometimes even better than the original products, is not the point in a peace-time market. Many industries are no longer forced to use paper, and it is plain that paper men will have to work more closely with other industries than they have for many years past. But there is no question but what the opportunity is there. That "paper has endless possibilities" is a literal truth. It is a truth that will take care of any expansion now in sight. But it is also a truth requiring the utmost in practical research, marketing and sales, in industries heretofore strange to pulp and paper men.

Magazine Field

The long-range outlook for the traditional markets for paper is still bright. *Standard and Poor's* predicts that magazine revenues this year will be well above prewar levels. The outlook is further brightened by an astounding increase in the use of color—which means higher revenue for the publishers and, of course, some increased headaches for the technical men in the book paper industry.

General magazines gained in 1946, and the business press was down only 2.7% from the war. Neither *Life* nor the *Saturday Evening Post* reached the 5,000,000 circulation predicted by themselves in 1946, but how much of this falling short

United States Paper Production, Imports Exports, and Consumption

(Quantities in Tons of 2,000 Pounds)

Year—	Production	Imports	Exports	Consumption Tons	Consumption Lbs., Capita	Year—	Production	Imports	Exports	Consumption Tons	Consumption Lbs., Capita
Newsprint											
1899	569,212	———	———	569,212	15.2	1934	989,705	2,209,698	23,405	3,175,998	50.2
1904	912,822	———	52,159	860,663	20.8	1939	954,259	2,615,129	13,495	3,555,893	54.2
1909	1,168,098	———	48,740	1,119,358	24.7	1941	1,043,999	2,982,375	70,265	3,956,109	59.9
1914	1,313,284	278,403	44,483	1,547,204	31.6	1943	811,309	2,637,429	35,256	3,413,482	50.3
1919	1,323,880	627,734	110,268	1,841,346	35.1	1944	720,752	2,491,000	31,000	3,180,590	46.8
1924	1,481,425	1,357,233	17,159	2,821,499	49.8	1945	725,475	2,668,799	43,611	3,350,623	48.0
1929	1,409,169	2,422,700	18,695	3,813,174	62.8	1946	775,042	3,490,280	27,685	4,237,637	60.4
Books											
1899	304,459	———	———	304,459	8.1	1934	1,055,247	4,730	12,066	1,047,911	16.6
1904	454,337	———	———	454,337	11.0	1939	1,546,930	13,749	22,463	1,538,216	23.4
1909	582,114	1,104	———	583,218	12.9	1941	2,025,891	28,506	51,752	2,002,645	30.4
1914	795,958	6,489	14,301	788,146	16.1	1943	1,592,878	28,000	31,566	1,589,312	23.4
1919	828,641	146	76,691	752,096	14.3	1944	1,435,785	28,000	38,467	1,425,318	21.1
1924	1,050,000	14,328	10,970	1,053,358	18.6	1945	1,492,566	29,689	62,455	1,459,800	20.9
1929	1,497,912	3,406	27,567	1,473,751	23.9	1946	1,918,655	81,050	59,845	1,939,860	27.6

Beginning with 1941, text papers allocated to fine papers.

Fine Papers											
1899	131,456	———	———	131,456	3.5	1934	434,870	879	10,263	425,486	6.7
1904	168,982	———	———	168,982	4.1	1939	613,995	573	20,498	594,070	9.0
1909	215,791	———	———	215,791	4.7	1941	950,014	2,750	46,783	903,390	13.7
1914	269,407	———	3,369	266,038	5.4	1943	1,020,061	663	58,525	962,376	14.4
1919	347,346	———	37,680	309,666	5.9	1944	974,372	407	68,367	906,305	13.3
1924	422,000	1,373	4,040	419,333	7.4	1945	1,009,243	589	86,598	923,234	13.2
1929	635,662	1,613	16,660	620,615	10.2	1946	1,143,257	477	82,682	1,061,052	15.1

From 1899 to 1940 inclusive, only writing and cover were included in fine papers. Beginning with 1941, text papers (from book), bristol (from paperboard), and "thin papers" (from tissue) have been added.

Wrapping and Bag											
1899	535,252	———	———	535,252	14.3	1934	1,356,115	5,124	32,160	1,329,079	21.0
1904	644,291	———	———	644,291	15.6	1939	2,238,993	14,954	41,014	2,212,933	33.8
1909	763,067	———	———	763,067	16.8	1941	2,778,441	4,490	90,357	2,692,574	40.8
1914	911,029	18,258	7,067	922,220	18.8	1943	2,470,039	1,009	54,999	2,418,840	35.7
1919	858,464	2,401	49,408	811,457	15.5	1944	2,559,447	2,133	49,560	2,513,687	36.9
1924	1,235,000	25,540	18,520	1,242,020	21.9	1945	2,641,229	802	51,690	2,590,341	37.1
1929	1,605,783	9,344	29,425	1,585,702	26.1	1946	3,007,396	7,072	50,086	2,964,382	42.2

Beginning with 1941, industrial papers have been included.

Tissue											
1899	28,406	———	———	28,406	0.7	1934	397,196	8,687	7,281	398,602	6.3
1904	43,925	———	———	43,925	1.1	1939	665,723	9,347	14,695	660,375	10.1
1909	77,745	———	———	77,745	1.7	1941	912,874	76	26,500	889,035	13.5
1914	115,401	———	———	115,401	2.4	1943	968,789	131	23,210	948,479	14.0
1919	190,561	245	———	190,806	3.6	1944	965,433	84	18,923	949,410	14.0
1924	242,000	6,795	4,368	244,427	4.3	1945	980,788	105	18,127	962,766	13.8
1929	387,811	10,527	7,725	390,613	6.4	1946	1,021,545	114	17,093	1,004,566	14.3

Beginning with 1941, "Thin Papers" have been allocated to fine papers.

Paperboard											
1899	394,111	———	———	394,111	10.5	1934	4,073,261	20,936	51,159	4,043,038	63.9
1904	559,711	———	———	559,711	13.6	1939	6,104,968	28,610	103,384	6,030,194	92.1
1909	883,088	———	———	883,088	19.5	1941	8,399,960	36,882	141,250	8,293,592	125.7
1914	1,291,805	———	———	1,291,805	26.4	1943	8,620,434	54,234	89,705	8,566,729	126.4
1919	1,867,064	44,461	61,890	1,849,635	35.2	1944	8,962,568	52,357	82,018	8,916,550	131.1
1924	2,850,000	55,275	48,661	2,856,614	25.5	1945	8,913,736	51,189	155,020	8,809,905	126.2
1929	4,451,187	42,351	94,374	4,399,164	72.4	1946	9,431,941	42,347	109,158	9,365,130	133.4

Beginning with 1941, bristols have been allocated to fine papers.

Source: American Paper and Pulp Assn.

of the goal was due to paper shortage and how much to buyer resistance is not clear at this point. But the health of such magazines is still bouncing, and this is true of magazines generally. As predicted by PULP & PAPER Industry more than a year ago, many of the projected new magazines never saw the light of day, and many a "war baby" failed to grow up. But increased circulations of the legitimate publications still kept paper demand higher than the production.

Rising costs in the magazine field should be watched by the book paper industry, for they may yet have an appreciable effect on the market. Mechanical cost of magazines, 1939 compared with 1945, zoomed up as follows: composition, presswork, binding and mailing, approximately 50%; paper costs, 24%; overall average in mechanical costs, 33%. These are sizable increases, and into them must be counted rises for staff members and increased expenses of editorial work and advertising solicitation. The end is not in

UNITED STATES PAPER PRODUCTION, IMPORTS, EXPORTS, AND CONSUMPTION

(Quantities in Tons of 2,000 Pounds)
TOTAL — ALL GRADES

Year	Production	Imports	Exports	Consumption Tons	Consumption Lbs. Capita
1899	2,167,593	.....	.....	2,167,593	57.9
1904	3,106,696	.....	77,704	3,028,992	73.3
1909	4,121,495	55,962	74,764	4,102,693	90.5
1914	5,152,705	349,278	106,713	5,395,270	110.2
1919	5,966,076	707,548	420,540	6,253,084	119.1
1924	7,929,985	1,500,433	149,541	9,280,877	164.0
1925	9,001,742	1,567,121	152,351	10,416,512	181.4
1926	9,794,086	1,973,451	183,130	11,584,407	198.8
1927	10,002,070	2,107,344	184,226	11,925,188	201.8
1928	10,403,338	2,266,828	218,730	12,451,436	207.8
1929	11,140,235	2,533,603	262,383	13,411,455	220.7
1930	10,169,140	2,365,272	215,811	12,318,601	200.7
1931	9,381,840	2,136,079	170,891	11,347,028	182.8
1932	7,997,872	1,848,016	119,292	9,726,596	155.6
1933	9,190,017	1,852,420	126,854	10,915,583	173.6
1934	9,186,598	2,265,281	163,199	11,288,680	178.3
1935	10,479,095	2,456,998	178,370	12,757,723	200.1
1936	11,975,552	2,855,153	179,727	14,650,978	228.1
1937	12,837,003	3,435,222	232,361	16,039,864	248.2
1938	11,380,814	2,357,477	208,064	13,530,227	207.8
1939	13,509,642	2,702,952	266,070	15,946,515	243.4
1940	14,483,709	2,826,880	578,248	16,732,341	254.2
1941	17,762,365	3,120,213	494,911	20,387,667	308.9
1942	17,083,862	3,046,207	390,837	19,739,132	296.8
1943	17,035,688	2,762,429	347,864	19,450,253	286.8
1944	17,182,804	2,616,000	312,917	19,485,887	286.6
1945	17,370,965	2,753,211	456,689	19,665,487	281.7
1946	19,179,355	3,625,422	393,301	22,411,476	319.3

Source: American Paper & Pulp Assn.

sight as we go to press. Higher advertising rates are the only answer, but there are signs of advertiser resistance to further increases in the general magazine field.

Book Publishing

Book sales are staying high in midyear of 1947, but here, too, the rising costs to the consumer bear watching. A mystery novel formerly $2.00 now costs from $2.50 to $2.75. An average sized novel now retails at $3.00 and a big hunk of fiction sells for $3.50. Nonfiction, often involving production costs higher than a novel, is on the bookstalls at from $3.50 to $5.00. The popular "pocket books" which sold for an easy quarter are now up to thirty and thirty-five cents, may reach fifty cents. But as yet, book publishers see no decline which they can ascribe to general buyer resistance on price.

One thing to remember, however, is the extreme sensitiveness of both the magazine and book publishing industries. The latter, especially, is a luxury industry, and a change can come within a space of weeks. Present U. S. wages allow for some luxuries, but a steady rise in food and clothing prices, for example, always hits hard the demand for book and magazine paper. In any discussion these days of the overall paper industry there arises the question as to whether the book paper field alone may find itself somewhat overexpanded due to the great trend in the past few years from newsprint to magazine paper. If there is to be an overexpansion here—and nothing would indicate it thus far—the blame must be laid at the feet of newspaper publishers and not the paper industry.

Newsprint In Demand

The trend toward conversion from newsprint to book was apparently halted in 1946 after a number of swift developments, and the period of the halt was marked by the Pejepscot Paper Co., Brunswick, Maine, being purchased by Hearst and reverting back to newsprint. Interesting, too, has been the purchase of several small mills by newspapers in the midwest, among these the Kansas City Star. In Tacoma, Wash., a group of west coast newspapers were financing restoration of a long idle mill. Alaska still beckons as a source of newsprint, but conditions there were still dubious to the private mill ownership and it is now believed that any near future action will have to come from publishers.

Despite the halting of the trend from newsprint to coated papers (which began many years ago and began to accelerate with the aggressive growth of big circulation magazines with giant presses to feed) it was a nervous 1946 for newspaper publishers and this year has seen only a little lessening of their worries. Swedish newsprint was coming in dribbles, and at a high price. A "gray market" flourished on less than carload lots of newsprint, and display advertisements inserted by small town publishers pleading for newsprint were not unusual in metropolitan papers of the eastern seaboard. That the newsprint situation could be relieved, and the national freedom of the press achieved if the big New York and Chicago newspapers would eliminate a few unnecessary pages from each Sunday edition seems not to have occurred to the big publishers—or, if it has, they have not suggested it. Something like this, however, did occur to the Senate Small Business Committee last March when it proposed a pool of newsprint from which small

newspapers could be assisted in an emergency.

Meanwhile the newsprint situation continues fantastic, with small rhyme or reason. As an example of the fantasy, French newsprint is selling at $250 per ton at New York dock, and some of it is being shipped across the continent to western newspapers. The French, meanwhile, are getting along with one-page newspapers in some instances. France is now getting pulp from Germany.

Tissue Gains

Tissue continued to show the gains begun last year and predicted for it in peace time. In last year's NORTH AMERICAN REVIEW NUMBER we took occasion to outline the history of tissue production from a mere 28,406 tons in its first recorded year through its big increase in the late Thirties and early Forties. New Pacific Coast tonnage is now in production, as are machines in the South and East and mid-West. The first facial tissue machine west of Wisconsin started up at Camas, Wash. Most other new tissue machines went into operation too late in 1946 to have an appreciable effect on 1946 figures, but their efforts will be shown strongly this year.

Pulp is discussed in another section of the 1947 NORTH AMERICAN REVIEW NUMBER, but because of its very direct bearing on the paper situation it is pertinent to say that most observers feel that the pulp market will be bullish for the remainder of this year. Nobody wants to predict beyond that. Opinion on the Swedish situation is beginning to vary. One school looks toward only about 500,000 tons annually from there, never expects to see a million-ton year again

Nineteen forty-six was a record breaking year, and AP&PA has listed some of those records as previously recorded, but the records that were not broken are quite as significant as those broken, AP&PA has pointed out. Imports and exports of pulp and exports of paper and paperboard failed to achieve any new figures.

Record in 1947

It looks like 21 or 22 million tons of paper this year, although we began with a serious shortage of market pulp. It is believed that paper production can be increased by one million tons over 1946. This can happen, however, only if pulp supplies reach expectations. But inventories were not dropping as this was written.

U. S. production of paper and paperboard during January 1947, at 1,762,929 tons, established a new high in the current monthly series according to preliminary figures released today by the Bureau of the Census. This figure was 185,178 tons above December 1946, 248,504 tons over January 1946, and 11,782 tons above the previous high in October 1946. The increase was general throughout the grade structure, the most substantial gains occurring in the coarse paper and container board segments.

Predictions, however, are becoming less popular. In some quarters we seem determined to talk ourselves into a recession if we cannot get one in a normal way. If there is a 1947 slump, as advertised, nobody can say there was no warning, and this very warning will help to get out the cushions.

But there is a big school of thought that new uses and applications for paper have already shoved up the growth of the industry. It does look as if the development of machine coated book paper has accomplished this for the book paper industry, and if this is true there is reason to believe it will happen in other divisions of the industry. Indeed, there are no evidences of boosted sales of kraft due to technical improvements in laminates, wet strength properties, and plastic applications.

It is important to bear in mind that consumer goods shortages have prevented the development of much of the progress in uses of paper that were expected to develop after the war. Export shipments may delay even further the development of fancy consumer packaging and luxury use of specialty papers—yet export means paper in huge quantities, as we discovered during the war.

But it has to be remembered that the average consumer has almost forgotten the fancy tastes he was beginning to acquire just when the war broke out. He has been glad to get anything, wrapped or unwrapped. He has lost some of his paper-using habits. Although our standard of living is by far the greatest in the world, we know that in many respects it is lower than in the past.

Paper-using habits, many of them, must be developed all over again.

Consumer and manufacturer have been a long, long way apart. When they get together again, as in the old days, there will be plenty of new uses for paper not now forseen even in the research laboratories. Whether this will happen in 1947 or in 1950 (and the industry is not sure it is in a hurry for it to happen) it must and will come. There are reasons to believe that the paper industry will climb eventually from sixth place in U. S. industry into the first three.

Chemical Prices In Pulp and Paper Industry

Chemicals for use in the pulp and paper industry were in short supply throughout 1946. Had there been more chemicals available for bleaching purposes during 1946 a greater volume of bleached pulp, and consequently an increased production of better grades of paper, would have been possible.

Average Annual Primary Market Prices for Specified Chemicals—Index 1926=100 (Est.)

	1946	1945	1929
Bleach powder	125.0	125.0	100.0
Caustic soda	73.1	71.9	92.2
Soda ash	75.3	73.4	94.1
Chlorine	44.8	43.8	73.9
Salt cake	98.1	98.1	83.1
Casein[2]	196.9	149.4	101.0
Sulphur	87.9	87.9	98.8
Rosin	135.2	117.2	62.1
Alumina sulfate	82.1	82.1	100.0
China clay[1]	8.0	8.0	(4)
Talc[1]	13.5	13.5	(4)

[1]In actual dollars and cents.
[2]Acid base used in period following 1942; previous years used 20-30 mesh.
Source: U. S. Dept. of Commerce.

Russian Industry Increases Output

Soviet Russia's industry had a very successful year in 1946, according to a report issued by the commissar of the pulp and paper industry.

Production of pulp increased 20% over 1945, that of paper 60%, paperboard 76% and kraft bags 86%. 1947 production schedules provide for further substantial increases: 75% in woodpulp, 28% in paper and 43% in paperboard.

No actual figures were given.

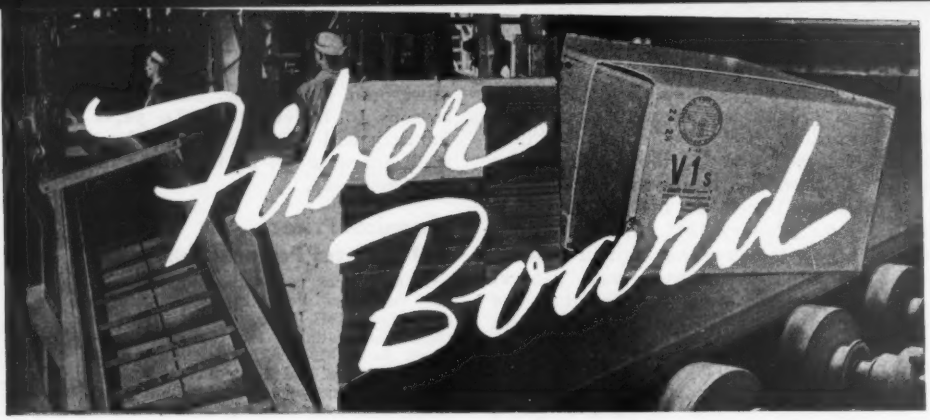
Argentine Imports

Argentine imports of paper products amounted to 278,100 short tons in 1946, as compared with 191,800 tons in 1945, representing an increase of 45 per cent.

APPA Publishes "The Statistics of Paper"

"The Statistics of Paper" is the title of a new booklet just published by the American Paper & Pulp Association, 122 East 42nd Street, New York. Said to be the result of some two and a half years of work on the part of the AP&PA's division for Economic Research, headed by Dr. Louis Stevenson, the book carries statistical tables compiled not only from the association's files but from Bureau of Census, Department of Commerce, Foreign Commerce and Navigation, and other agencies.

The book carries data on pulpwood, wood pulp, waste fibrous materials, paper, paperboard and paper products, and concludes with summary data. A number of maps are included with the statistical tables. Dates of the tables range, in some instances, from 1869 to and including 1946. The purpose here, according to E. W. Tinker, executive secretary of AP&PA, is to give "a broad historical perspective of the growth of the industry."



ALL-TIME RECORD DUE THIS YEAR— BUT FOOD PACKS DECLINE SLIGHTLY

U. S. PAPERBOARD PRODUCTION
(In Tons)

	1944	1945	1946
Container	4,228,304	4,130,424	4,303,228
Folding box	2,116,152	2,266,861	2,668,815
Set-up box	750,313	718,972	594,451
Cardboard	69,709	69,924	85,086
Building	1,087,467	1,121,824	1,243,436
Miscellaneous	710,623	597,623	536,925
Tube stock	458,107	361,034	.....
Total	8,962,568	8,905,628	9,431,941

Source—U. S. Census.

Anyone who might have thought that fiberboard demand would decline when the peak military requirements eased off is experiencing a real surprise.

For as paperboard, building board and other like mills went into the month of April, their production was running substantially ahead of 1946— and 1946 was an all-time recordbreaking year for the industry. However, frozen food and food packaging was expected to show a slight decline in 1947. Details on this are given later in this article.

U. S. Census Bureau figures showed production of 9,431,941 tons of all kinds of board in 1946, which easily beat the 1944 record of 8,962,568, and went over the nine-million mark for the first time in history.

There were new records set for container board, for folding box, for cardboard, for building board. A decline in recent years in set-up boxboard continued, but this was more than offset by the biggest increase of all categories in folding boxboard, over 400,000 tons.

The National Paperboard Association, reporting on information from its members which give, perhaps, a more exact appraisal if its own class of mills, showed new totals for 1946 somewhat less in each category than the U. S. figures. But in every case the association data were in line with the government figures, albeit somewhat behind them. In comparison with their own previous data, the Association showed new all-time records in all categories except set-up box, but the upsurge in folding box more than made up for that decline.

The government's figures are shown in a table on this page. As for the National Paperboard Association, their totals went over the eight-million mark for the first time and for the sixth year in a row surpassed 7,000,000 tons, and continued to run about 50% above the pre-war levels, as for example, 4,938,000 tons in 1938. The association grand total for 1946 was 8,449,800 tons which compared with the 1944 record of 7,922,900 and pushed 1941's 7,891,000 tons into third place.

The association figures for 1946 also showed new records of 4,311,700 tons for container board and 2,309,500 tons for folding boxboard. The set-up boxboard production, according to the association, has been declining for five years from the high of 731,500 tons in 1941 to 445,700 tons in 1946. But with nearly a 500,000 increase in folding boxboard, the total boxboard output hit a new high of 4,138,100 tons. In liner board, jute showed the big increase with kraft cylinder declining and kraft Fourdrinier off the 1944 record but climbing again. In corrugating materials, the kraft type has been dropping but straw and bogus types have increased more. A decline is shown in chipboard.

In a summary, the association showed kraft grades in the board field at 1,859,900 tons as compared with the jute class of products at 6,589,900. The kraft products were slightly off records for 1941 and 1942 but the other types were a half million above any previous year and more than a million above 1941 and 1942 years. It seemed to indicate that the big kraft production increase is going into higher market value paper products, while other fiberous materials are finding use in paperboard.

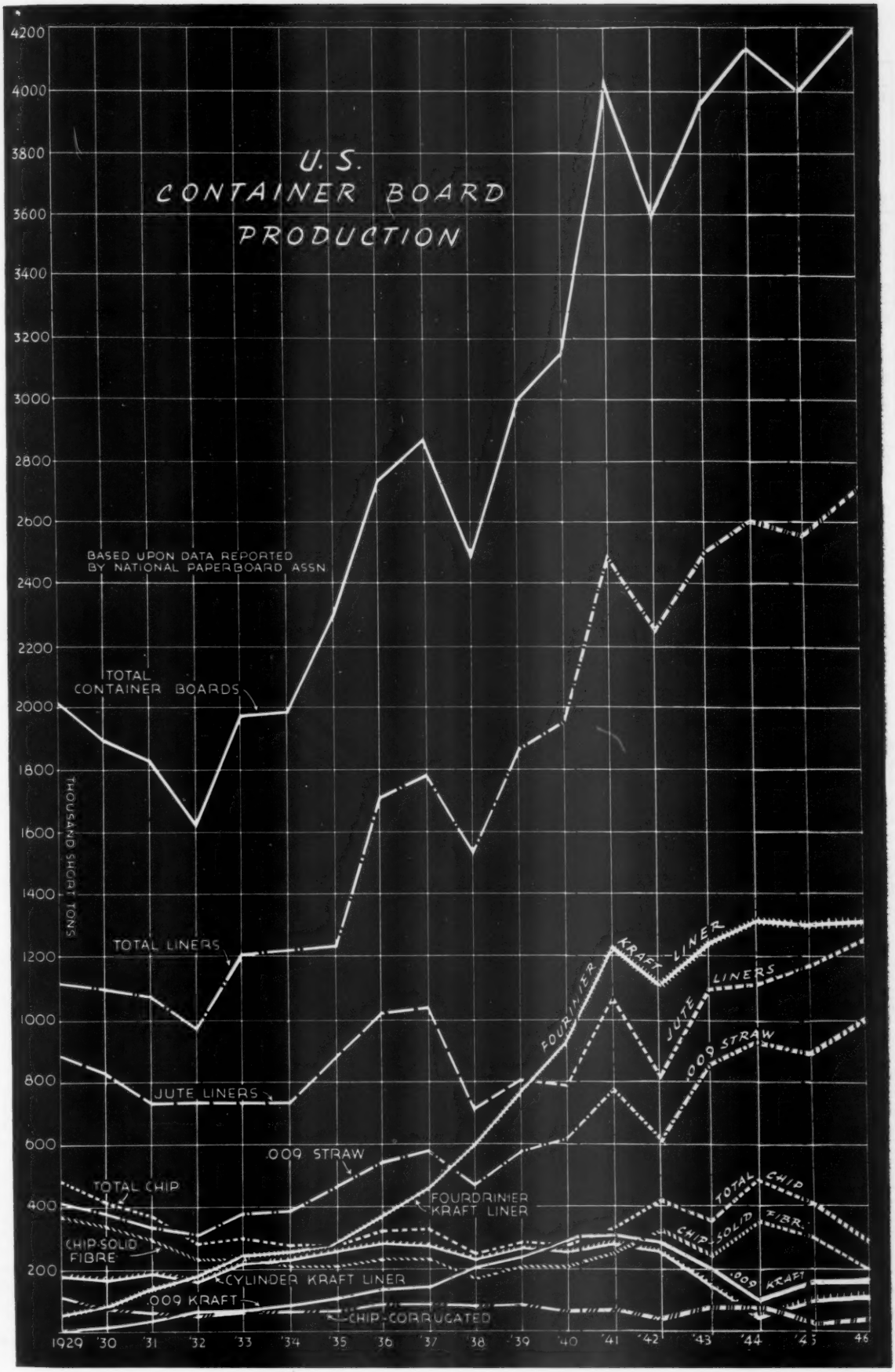
It was pretty certain as this issue went to press that another record year for paperboard is in the making in 1947. U. S. production as the industry entered April had risen to a pace of 180,000 tons a week, nearly 8% over the corresponding 1946 period.

The tremendous expansion underway in building boards opens up a great field of utilization for former wood waste and companies such as Simpson Logging Co., one of big operators on the West Coast, have become distinguished additions to the pulp and paper industry of the North American continent. The expiration of the Masonite patents in 1944 has been a stimulant to active interest in the production of hardboards and, meanwhile, much greater use of softboard for building and insulation has been encouraged. The fuel oil rationing of war years made the general public acutely aware of the value of these products.

Small Decline in 1947 In Food Packs of U. S.

Despite a slowdown in general food purchases in the winter of 1946, the U. S. food processing industries will require a heavy tonnage of paperboard and other paper products to handle their 1947 packs, according to present indications.

In the canning field, the current season should see curtailment in the output of some products, which will be reflected in a minor decline in the demand for can labels and fiber shipping cases. The 1947 pack of all major canned foods is expected to approximate 550 million cases, which compares with 1945 and 1946 packs as follows:


U.S.
CONTAINER BOARD
PRODUCTION
BASED UPON DATA REPORTED
BY NATIONAL PAPERBOARD ASSN
THOUSAND SHORT TONS
TOTAL
CONTAINER BOARDS
TOTAL LINERS
JUTE LINERS
.009 STRAW
TOTAL CHIP
CHIP-SOLID
FIBRE
.009 KRAFT
CYLINDER KRAFT LINER
CHIP-CORRUGATED
FOURDRINIER
KRAFT LINER
JUTE LINERS
.009 STRAW
FOURDRINIER
KRAFT LINER
TOTAL CHIP
CHIP-SOLID FIBR.
.009 KRAFT
4200
4000
3800
3600
3400
3200
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
1929
'30
'31
'32
'33
'34
'35
'36
'37
'38
'39
'40
'41
'42
'43
'44
'45
46

PAPERBOARD MILL CENSUS

Tons

CONTAINER BOARDS

GRADES	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946
LINERS										
Jute	1,047,600	674,900	794,300	796,400	1,074,300	820,800	1,089,100	1,167,300	1,185,800	1,262,900
Kraft Cylinder	290,800	238,900	279,800	246,200	285,300	276,700	152,300	93,200	97,100	144,500
Kraft Fourdrinier	461,600	638,200	803,800	923,300	1,201,300	1,174,700	1,252,900	1,340,400	1,308,000	1,311,400
Total Kraft	752,400	877,100	1,083,600	1,169,500	1,486,600	1,451,400	1,405,200	1,433,600	1,405,100	1,455,900
TOTAL LINERS	1,800,000	1,552,000	1,877,900	1,965,900	2,560,900	2,272,200	2,494,300	2,600,900	2,590,900	2,718,800
CORRUGATING MATERIALS										
Straw, Bogus, Etc.	589,100	461,400	574,900	611,400	806,400	662,800	870,800	969,600	956,900	1,088,600
Kraft	148,400	212,100	263,000	292,000	326,200	269,300	157,600	120,400	154,600	174,100
TOTAL CORR. MATERIALS	737,500	673,500	837,900	903,400	1,132,600	932,100	1,028,400	1,090,000	1,111,500	1,262,700
CHIP										
Corrugating	96,200	76,500	75,900	75,500	77,900	72,200	83,800	96,800	83,000	114,200
Solid Fibre	246,800	177,800	208,600	202,800	273,000	330,800	333,500	338,100	314,200	216,000
TOTAL CHIP	343,000	254,300	284,500	278,300	350,900	403,000	417,300	434,900	397,200	330,200
TOTAL	2,880,500	2,479,800	3,000,300	3,147,600	4,044,400 *	3,607,300	3,948,000 *	4,125,800 *	4,099,600 A *	4,311,700 A *
BOXBOARDS										
Folding Box	1,237,800	1,162,400	1,385,100	1,413,100	1,749,300	1,560,500	1,737,500	1,782,500	1,868,300	2,309,500
Set-Up Box	570,000	518,800	585,700	613,200	731,500	615,900	599,600	543,200	510,800	445,700
Total	1,807,800	1,681,200	1,970,800	2,026,300	2,480,800	2,176,400	2,337,100	2,325,700	2,379,100	2,755,200
Other	867,200	777,500	976,400	1,144,200	1,365,800	1,363,000	1,352,400	1,474,100	1,404,000	1,382,900
TOTAL	2,675,000	2,458,700	2,947,200	3,170,500	3,846,600	3,539,400	3,689,500	3,799,800	3,783,100	4,138,100
SUMMARY										
JUTE,Liner,Corr.,Chip Boxboard, Etc.	4,576,700	3,776,800	4,474,000	4,632,900	5,903,400	5,220,400	5,850,100	6,109,400	6,087,100	6,589,900
KRAFT,Liner,Corr.,Etc.	978,800	1,161,700	1,473,500	1,685,200	1,987,600	1,926,300	1,779,400	1,816,200	1,795,600	1,859,900
TOTAL ALL GRADES	5,555,500	4,938,500	5,947,500	6,318,100	7,891,000	7,146,700	7,629,500	7,925,600	7,882,700	8,449,800

Issued March 12, 1947

NATIONAL PAPERBOARD ASSOCIATION

U. S. FOOD PACKS

	*Million Cases**	
	1945	*1946*
Fish	19	18
Meat	39	40
Poultry	2	3
Baby foods	14	15
Soups	33	48
Non-seasonal vegetables	46	55
Milk	90	73
Fruits	49	71
Seasonal vegetables	169	188
Fruit, vegetables juices	107	112
TOTALS	568	623

*Standard cases of size commonly used for each product.

In the dried food industry, the most significant development of pulp and paper firms is the considerable swing that is occurring in the direction of more and better retail consumer packages. In the past, at least two-thirds of the billion-pound U. S. dried fruit pack has gone to market in institutional or manufacturing packages of 25 and 30 pounds.

The 1946 season saw several newcomers with automatic carton filling and sealing machines, and many more now have orders in the hands of machinery manufacturers for 1947 delivery. To a lesser extent, the same trend is evident in the two-billion-pound dried vegetable business.

These moves toward consumer packaging are significant, for such packs require the same outer fiber shipping cases as the bulk production, plus millions of individual cartons.

The 1947 season is expected to see a pack of about 2,000,000 short tons of the major dried foods, which compares with 1945 and 1946 production in the United States as follows:

DRIED FOODS PACKS

	Thousand Tons	
	1945	*1946*
Dried fruits	566	516
Dried beans and peas	950	1,136
Dried eggs	54	57
Dried milk, edible	450	429
Dehydrated vegetables	63	11
TOTALS	2,083	2,149

The U. S. frozen food industry shared with canners and other food processors the unpleasant slow-up which hit all phases of the food business in Nov. 1946, and which continued well into 1947. The effect on the freezing companies was especially severe because their industry (a) is a relative newcomer on the scene, (b) was greatly expanded by the war, (c) in 1946 developed an oversupply of low-grade products turned out by inexperienced firms, and (d) saw its prices forced too high by rising costs of raw materials, labor and supplies.

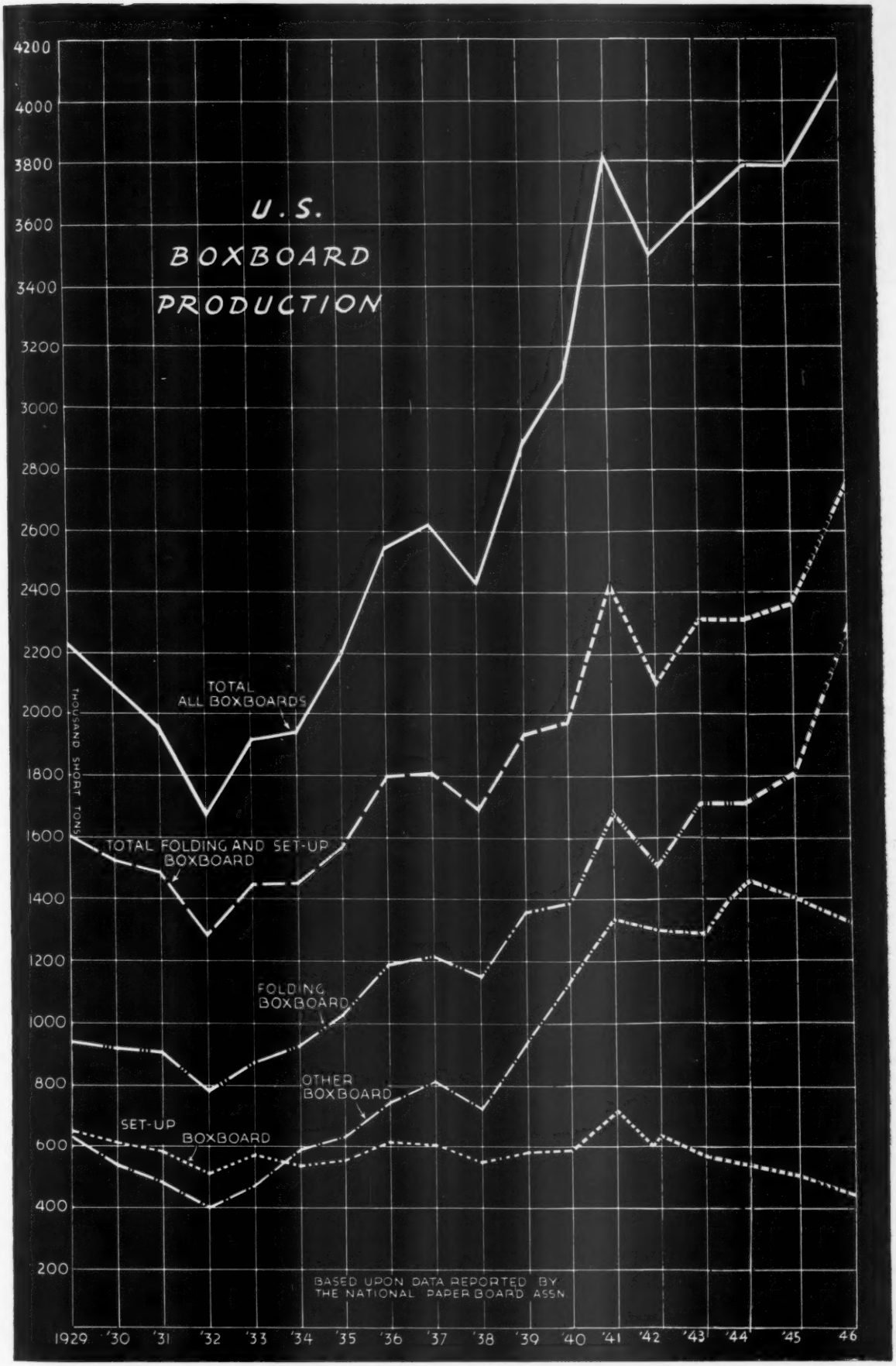
The industry's expansion is shown by the following figures on the industry's output, in millions of pounds:

FROZEN FOOD PRODUCTION

	Million Pounds		
	1936-40 Ave.	*1941-45 Ave.*	*1946**
Fruits, berries	138	295	480
Vegetables	66	208	380
Poultry**	101	138	318
Eggs	178	364	400
Meats**	294	334	259
Fish	183	258	280
Precooked foods		8	45
TOTALS	960	1,605	2,162

*Preliminary data. **Year-end stocks, since no pack figures are available.

At the industry's annual convention, held in San Francisco in March, 1947, packers and distributors took cognizance of their difficulties, and made plans to overcome them. Indications are that the 1947 pack will drop back to about 1,500,000,000 pounds.


U.S.
BOXBOARD
PRODUCTION
TOTAL
ALL BOXBOARDS
TOTAL FOLDING AND SET-UP
BOXBOARD
FOLDING
BOXBOARD
OTHER
BOXBOARD
SET-UP
BOXBOARD
THOUSAND SHORT TONS
BASED UPON DATA REPORTED BY
THE NATIONAL PAPER BOARD ASSN.
4200
4000
3800
3600
3400
3200
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
1929
'30
'31
'32
'33
'34
'35
'36
'37
'38
'39
'40
'41
'42
'43
'44
'45
46



17,000,000 TONS ARE PRODUCED BY U. S. AND CANADA: FUTURE PROSPECTS

Production and consumption record of pulp on the North American continent in 1946 smashed all previous records in the history of the industry. But even that wasn't enough, with an even higher demand and a sharp decline in overseas shipments.

Production of pulp in the United States and Canada combined in 1946 was virtually 17,000,000 tons. It was not quite a record in the U. S. itself, where 10,606,000 tons were produced, just under the record of 1942 (10,783,000 tons) but almost a half million above 1945 and 1944. But the record for the continent for all time was achieved because Canada made nearly 6,400,000 tons, virtually a million tons more than it had manufactured in any year since 1941, when its total was 5,720,000.

Washington First, Maine Second

Washington State continued to lead the parade of the 48 states as the biggest producer of wood pulp in the Union. Its total of 1,332,940 tons was comfortably ahead of Maine, No. 2 pulp state, which produced 1,185,232 tons. No other states passed the million mark, although Louisiana was close with 989,366 and Wisconsin was fourth with 889,139 tons.

This is the same way these four leading states ranked in 1944 and 1945 but there was some uncertainty as to the state which could claim fifth place. This was because the Department of Commerce lumps the totals for the two Carolinas—North and South—at 923,926, while Florida with 694,594 and New York with 555,847 tons were next.

All these states showed increases over their 1945 production figures. In 1945, Washington led the field with an output of 1,265,436 tons. Maine was second with 1,097,939 tons. Louisiana was third with 949,221 tons. Wisconsin was fourth with 875,408 tons. The two Carolinas combined ranked next with 880,219 tons. In that year, too, all these states, except the Carolinas, showed slight increases over 1944, but the latter dropped off rather sharply

WASHINGTON LEADS STATES; MAINE, SECOND; LOUISIANA RANKS THIRD; WISCONSIN IN FOURTH

U. S. Production of Wood Pulp by States and Regions in Tons

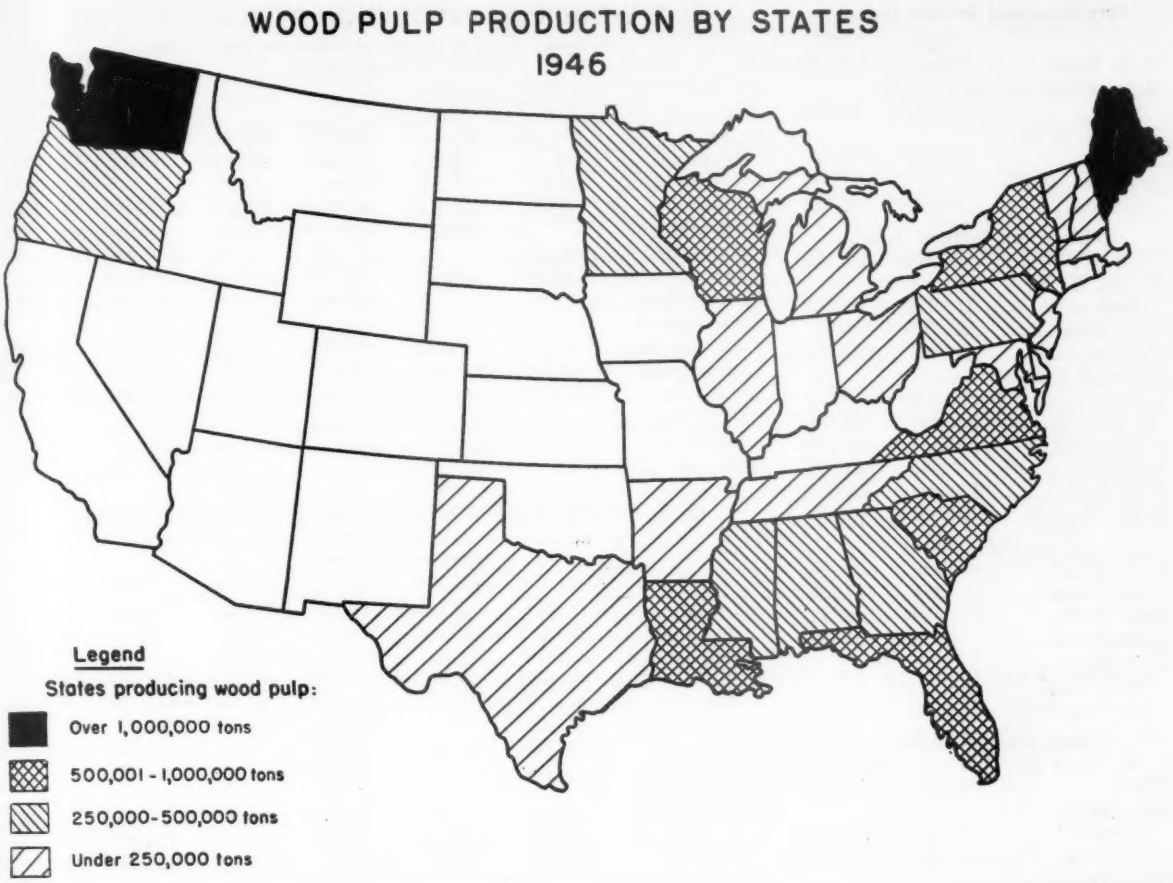
	1944	*1945*	*1946*
United States total	10,108,443	10,167,200	10,606,527
New England States	1,277,826	1,333,581	1,422,096
Maine	1,043,209	1,097,939	1,185,232
New Hampshire	179,129	182,964	177,434
Vermont	20,508	17,653	59,430
Massachusetts and Rhode Is.	34,980	35,025	
Middle Atlantic States	811,379	812,116	891,145
New York	497,252	497,314	555,847
New Jersey	46,158	52,304	62,700
Pennsylvania	267,969	262,498	272,598
East and West North Central States	1,475,637	1,494,056	1,516,528
Ohio, Illinois and Iowa	72,396	79,505	88,911
Michigan	206,754	201,811	219,873
Wisconsin	857,986	875,408	889,139
Minnesota	338,501	337,332	318,605
South Atlantic States	2,644,854	2,597,873	2,688,340
Maryland and Virginia	657,312	612,085	647,172
North and South Carolina	917,112	880,219	923,926
Georgia	415,282	416,205	422,648
Florida	655,148	689,364	694,594
East South Central States	883,777	934,076	919,293
Tennessee and Alabama	430,663	456,877	455,837
Mississippi	453,114	477,199	463,456
West South Central States	1,346,254	1,357,123	1,415,777
Louisiana	929,313	949,221	989,366
Arkansas and Texas	416,941	407,902	426,411
Pacific Coast States	1,668,716	1,638,375	1,753,348
Washington	1,256,374	1,265,436	1,332,940
Oregon	412,342	372,939	406,716
California			13,692

REGIONAL PERCENTAGES OF UNITED STATES WOOD PULP PRODUCTION

Total and by Grades in 1944, 1945 and 1946

	Sulphite			Sulphate			Groundwood			Soda			Total		
Region	1944	1945	1946	1944	1945	1946	1944	1945	1946	1944	1945	1946	1944	1945	1946
New England	21	22	21.5	*	1*	1	36	35	35.5	28	29	30	13	14	14
Middle Atlantic	12	11	11	2*	2.5*	1.5	16	15	15.5	34	34	33	8	8	8
Lake States	25	26	24.5	7	5*	6	26	24	22	10**	11*	12*	14.5	14	14
South	4	4	4	82	82	82.5	5	10	10	28	26	25	47	47	46.5
West Coast	38	37	39	9	9.5	9	17	16	17	**	*	*	17.5	17	17.5
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

*Data combined with that of another region to avoid disclosing one company's data.
Source: United States Pulp Producers Assn.



THIS IS A REVISION OF A U. S. PULP PRODUCTION MAP FOR 1945 ORIGINALLY PREPARED BY AMERICAN PAPER AND PULP ASSOCIATION. IN REVISING IT FOR 1946, IT WAS NECESSARY TO MAKE ONLY ONE CHANGE. NEW YORK MOVED UP ONE CATEGORY TO JOIN STATES PRODUCING 500,000 TO 1,000,000 TONS.

from its total of that year.

Comparing 1945 totals with 1943 figures (see 1946 North American Review Number of PULP & PAPER INDUSTRY), Washington's total was more than 112,000 tons above that state's production in 1943. Maine, on the other hand, showed a very slight decline of about 5,000 tons. Louisiana's 1945 total was more than 80,000 tons over that of 1943. The Carolinas were almost back to their 1943 level.

There will be noted that there is a slight discrepancy between the pulp figures for the United States developed by the Department of Commerce and those by the U. S. Pulp Producers Association—for instance, total U. S. production was reported as 10,606,527 tons by the government and 10,605,225 tons by the association. In all tables in this section, listed sources should be noted to explain any discrepancies.

Highly interesting are the government's figures showing how different states compared in production of different grades and types of pulp during 1946. Washington and Oregon, for instance, were lumped together as top producer of bleached sulfite—637,328 tons and Wisconsin was second, 346,757 (which undoubtedly exceeded Oregon alone). In unbleached sulfite, Washington led with 193,775 tons, more than all New England and more than the Lake States, too.

In bleached sulfate pulps, five Southern states and Washington were grouped together as the leader but in unbleached sulfate there was no doubt which state was "champion"—Louisiana, with 708,400 tons, far above any other.

Here are the Department of Commerce statistics (the grouping of the states is their's, in some cases perhaps to avoid disclosing output of individual mills, as for example, Florida's only sulfite mill—Rayonier):

	1946	1945
Bleached Sulfite Pulp (Tons)		
U. S. total	1,692,077	1,543,762
Maine	193,132	168,665
New Hamp. Mass.	162,588	167,049
N. Y. and Penn.	168,233	158,164
Michigan	66,261	64,662
Wisconsin	346,757	319,048
Minnesota, N. C., Fla.	117,778	116,522
Wash., Oregon	637,328	549,652
Unbleached Sulfite (Tons)		
U. S. Total	784,391	815,969
New England	174,437	175,774
N. Y.-Penn.	107,409	105,370
Mich.-Minnesota	46,394	55,605
Wisconsin	126,466	145,931
Washington	193,775	207,128
Oregon	135,910	126,161
Bleached Sulfate (Tons)		
U. S. Total	759,137	705,104
Penn.-Mich.-Wis. Minn.	103,085	103,856
South Atlantic.. Ala.-Miss.-Ark. La.-Tex.-Wash.	272,397	240,675
	383,655	360,573

	1946	1945
Semibleached Sulfate (Tons)		
U. S. Total	152,337	148,540
Mich.-Minn.-Wis.	33,010	29,247
Virginia, N. C., Ala.	68,937	78,571
Ark.-Tex.-Wash. Oregon	50,390	40,722
Unbleached Sulfate (Tons)		
U. S. Total	3,685,857	3,618,231
Maine, N. Y., Mich.	119,976	96,342
Wis.-Minn.	161,767	180,869
Virginia	326,615	320,377
N. and S. Carolina	665,300	609,215
Georgia-Florida	881,661	866,770
Alabama-Miss.	261,604	261,269
Louisiana	708,400	691,306
Ark.-Texas	232,668	229,917
Wash.-Oregon	327,866	362,166
Soda Pulp (Tons)		
U. S. Total	466,896	429,757
Maine-Mass.	143,351	127,726
New York	73,449	68,971
Pennsylvania	76,275	65,668
Ohio-Minn.-Tenn.-N. C.-Va.-Tex.-Wash.	173,821	167,392
Groundwood (Tons)		
U. S. Total	1,811,622	1,696,184
Maine	615,560	576,611
New Hamp.-Vermont	33,236	25,296
N. Y.-Penn.	281,879	246,888
Mich.-Minnesota	181,550	199,071
Wisconsin	209,269	204,444

U. S. WOOD PULP PRODUCTION BY REGIONS — 1946

All Grades except defibrated, exploded and asplund fibre.
(Tons of 2,000 pounds)

	New Eng.	*Mid. Atl.*	*Lake*	*Pacific*	*South*	*Total*
Sulfite	534,185	275,449	608,381	961,676	92,828	2,472,519
Bleached	357,316	168,159	435,634	632,649	92,828	1,686,586
Unbleached	176,869	107,290	172,747	329,027	0	785,933
Sulfate	45,022*	124,511*	231,563*	399,222	3,786,445	4,586,763
Bleached	0	124,511*	*	71,360	708,099	903,970
Unbleached	45,022*	*	231,563	327,862	3,708,346	3,682,793
Soda	143,358	158,459	54,696*	*	119,946	476,454
Semichemical	0	0	46,992*	*	307,310	354,302
Screenings & Off Quality	28,182	10,012	24,736	22,033	119,946	204,909
Groundwood	643,091	279,265	398,322	312,028	178,894	1,811,600
TOTAL	1,393,838	847,696	1,364,690	1,694,959	4,605,364	9,906,547

*Data combined with that of another region to avoid disclosing one company's data.
Source: As reported to U. S. Pulp Producers Association by 96% of the industry and estimated for 4%.

U. S. WOOD PULP PRODUCTION BY REGIONS — 1945

All Grades except defibrated, exploded and asplund fibre.
(Tons of 2,000 pounds)

	New Eng.	*Mid. Atl.*	*Lake*	*Pacific*	*South*	*Total*
Sulphite	*512,002*	*263,334*	*607,247*	*877,837*	*97,399*	*2,357,819*
Bleached	336,624	157,490	403,030	544,543	97,399	1,539,086
Unbleached	175,378	105,844	204,217	333,294	0	818,733
Sulphate	*40,582**	*118,191**	*240,126**	*426,174*	*3,652,263*	*4,477,282*
Bleached	0	118,191*	*	64,280	655,788	838,259
Unbleached	40,528*	*	240,126	361,894	2,996,475	3,639,023
Soda	127,872	148,733	50,195*	*	116,436	443,236
Semichemical	0	*	27,129*	*	297,447	324,576
Screenings & Off Quality	25,222	8,193	20,208	24,411	116,490	194,524
Groundwood	601,217	251,700	404,208	263,367	176,959	1,697,451
Total	1,306,841	790,151	1,349,113	1,591,789	4,456,994	9,494,888

*Data combined with that of another region to avoid disclosing one company's data.
Source: As reported to the U. S. Pulp Producers Association, and estimated for 1% of total production.

TOTAL UNITED STATES PRODUCTION OF WOOD PULP

By Grades — 1925-1946
(Tons of 2000 pounds)

Year.	Total	Unbleached Sulphite	Bleached Sulphite	Total Sulphate	Groundwood	Soda	All Other
1925	3,962,217	790,510	612,576	409,768	1,612,019	472,647	64,697
1926	4,394,766	911,729	646,466	519,960	1,764,248	496,920	55,463
1927	4,313,403	872,411	680,288	603,253	1,610,409	487,478	59,564
1928	4,510,800	836,751	722,107	774,225	1,610,988	488,641	78,088
1929	4,862,885	848,754	839,953	910,888	1,637,653	520,729	104,908
1930	4,630,308	815,897	751,166	949,513	1,560,221	474,230	79,281
1931	4,409,344	675,859	740,812	1,034,291	1,449,240	374,054	135,088
1932	3,760,267	548,702	596,937	1,028,846	1,203,044	290,703	92,035
1933	4,276,204	601,102	726,473	1,259,351	1,197,553	457,790	33,935
1934	4,281,428	599,905	806,612	1,240,967	1,253,398	477,089	35,457
1935	5,032,299	634,947	944,620	1,467,749	1,355,819	485,162	144,002
1936	5,695,219	693,903	1,127,039	1,794,734	1,475,620	557,695	46,228
1937	6,713,576	791,575	[1]1,348,669	2,139,087	1,600,667	507,548	326,030
1938	5,933,560	601,855	[2]1,004,621	2,443,057	1,333,308	395,307	155,418
1939	6,993,000	729,000	1,217,000	2,963,000	1,445,000	442,000	198,000
1940	8,960,000	996,000	1,612,000	3,748,000	1,579,000	532,000	493,000
1941	10,375,000	1,216,000	1,703,000	4,527,000	2,152,000	480,000	663,000
1942	10,783,000	1,213,000	1,717,000	4,738,000	1,756,000	462,000	897,000
1943	9,680,000	883,000	1,553,000	4,236,000	1,638,000	419,000	951,000
1944	10,108,000	863,000	1,523,000	4,549,000	1,639,000	413,000	1,122,000
1945	10,165,000	816,000	1,542,000	4,469,000	1,697,000	430,000	1,210,000
1946	10,606,527	784,437	1,692,077	4,597,331	1,811,622	466,896	1,254,210

Source: Bureau of the Census.
1925 through 1939, data on "defibrated, etc." included in "Groundwood" and thereafter in "All Other."

	1946	1945
Va.-Fla.-Ala.-Miss.-La.-Tex.	178,042	180,335
Wash.-Oregon	312,086	263,539
Asplund Fiber and Similar Grades		
U. S. Total	761,544	690,675
Maine-R. I.-N. Y.-Penn.	69,756	57,549
New Jersey	62,700	52,304
Ill.-Ohio-Wis., Minn.	134,466	120,469
Alabama-Miss.	370,905	393,161
Calif.-La.-Va.-Fla.-Ga.-Md.	123,717	67,192
Screenings—Miscellaneous		
U. S. Total	492,666	518,978
Maine	17,791	16,780
New Hamp.-Mass.	8,278	8,317
N. Y.-Penn.	9,289	10,242
Michigan-Iowa	3,294	5,672
Wis.-Minn.	27,670	20,139
South	371,883	411,382
Washington	10,998	14,343
Oregon	43,463	32,103

Oliver M. Porter, executive director of the U. S. Pulp Producers' Association, estimated a 19.2% increase in U. S. pulp imports in 1947, but he hedged by saying increased world demand for pulp and increased conversion of pulp in Scandinavia may reduce this figure. Here are his figures for 1946 and his prediction for 1947:

U. S. PULP IMPORTS

	1946—Tons—	1947
From Canada	1,234,218	1,300,000
From Sweden	445,124	650,000
From Finland	115,220	165,000
From Norway	None.	25,000

U. S. CONSUMPTION OF MARKET AND NON-MARKET PULP IN 1946

(By Paper and Paperboard Industry)

	Total	Non-Market Pulp	Market Pulp	Non-Market Pulp as % of Total Consumption	Market Pulp as % of Total Consumption
Bleached Sulfite	1,681,570	972,725	708,845	58%	42%
Unbleached Sulfite	1,464,008	684,197	779,811	47%	53%
Bleached Sulfate	837,130	719,009	118,121	86%	14%
Semibleached Sulfate	185,188	164,997	20,211	89%	11%
Unbleached Sulfate	4,125,886	3,595,402	530,484	87%	13%
Soda	488,759	387,185	101,574	79%	21%
Groundwood	2,037,295	1,823,911	213,384	89½%	10½%
All Other	1,268,664	1,205,297	63,367	95%	5%
TOTAL, All Grades	12,088,500	9,552,703	2,535,797	79%	21%

Source: Dept. of Commerce.

PROPORTION OF UNITED STATES MARKET FOR PULP SUPPLIED BY AMERICAN PULP MILLS AND FOREIGN PULP MILLS—1939-1944-1945-1946

Tons—2,000 Lbs.

TOTALS By Grades.	Pulp Produced By U. S. Mills for Sale in Domestic Market — 1939	Pulp Imported Into United States — 1939	Pulp Produced By U. S. Mills for Sale in Domestic Market — 1944	Pulp Imported Into United States — 1944	Pulp Produced By U. S. Mills for Sale in Domestic Market — 1945	Pulp Imported Into United States — 1945	Pulp Produced By U. S. Mills for Sale in Domestic Market — 1946	Pulp Imported Into United States — 1946
	1939		1944		1945		1946	
Total—All Grades	1,049,753	2,035,249	1,500,000	1,072,000	1,455,667	1,754,065	1,294,794	1,794,562
Total—Sulphite	685,774	1,135,302	946,635	712,000	945,150	1,045,753	930,601	1,043,617
Bleached Sulphite	464,296	474,109	752,713	321,000	738,461	388,456	777,709	425,028
Rayon, Special Chemical	106,760	88,052	420,921	135,000	346,541	146,032	289,809	202,375
Other	319,687	386,057	331,792	186,000	391,920	242,424	487,900	222,653
Unbleached Sulphite	219,012	661,193	193,922	391,000	206,689	657,297	152,892	618,589
Total—Sulphate	143,614	654,419	378,223	146,000	344,064	452,428	177,290	477,603
Bleached Sulphate	77,786	108,252	99,637	59,000	113,485	91,996	47,929	79,697
Unbleached Sulphate	65,793	546,167	278,586	87,000	230,579	360,432	129,361	397,906
Total Groundwood	30,194	227,432	50,015	168,000	52,779	222,710	55,310	239,436
Total Soda	86,591	8,952	96,843	16,000	83,398	21,157	85,891	19,740
Total Semi-Chemical	———	———	701	0	———	———	———	———
Total—Miscellaneous, Damaged and Off-Quality	16,189	192	27,958	30,000	30,276	12,017	45,702	14,166

"Pulp Produced by U. S. Mills for Sale in Domestic Market" includes that part of the stocks on hand at the end of the year intended for future shipment to domestic buyers.

Source: United States Pulp Producers Association. Figures exclusive of defibrated and exploded wood pulp and asplund fiber.

SUMMARY FOR 1946* OF UNITED STATES WOOD PULP PRODUCTION, SHIPMENTS *and* STOCKS

(Tons of 2,000 lbs., air dry weight)

	Production	Used**	Shipments Domestic Market	Shipments Export	Stocks on Hand** End of Period 12/31/46	Stocks on Hand** End of Period 1/1/46
Total All Grades* 1946	9,906,547	8,591,195	1,280,648	35,206	70,693	71,195
Total Bleached Sulphite	1,686,586	889,826	778,051	15,488	20,326	17,105
Total Unbleached Sulphite	785,933	617,198	152,316	16,367	9,513	9,461
Total Bleached Sulphate	903,970	852,483	47,855	795	6,836	3,999
Total Unbleached Sulphate	3,682,793	3,552,916	129,387	2,162	7,222	8,894
Total Soda	476,454	390,495	85,804	0	2,088	1,933
Semichemical/Other	354,302	354,299	0	0	140	137
Groundwood	1,811,600	1,759,669	55,515	0	22,897	26,481
Screenings and Off-Quality	204,909	174,309	31,720	394	1,671	3,185

*All grades of wood pulp except defibrated and exploded.
**Covers only pulp manufactured by producing mills or transferred to their subsidiaries. Does not include purchased pulp.
Source: As reported to the United States Pulp Producers Assn. by companies producing 96% of total U. S. production and estimated for 4%.

These are the only possible outside sources of pulp for U. S. mills for sometime to come. No pulp can be produced in Alaska in less than two years, even if necessary timber surveys and building began now, and when a mill is built its product may be entirely converted to paper in Alaska. Russia is hardly a prospective pulp source for U. S. mills. There are no other important pulpwood areas.

Reports from Sweden say that the forests have been overcut in the northern sections of the country, partly because of the serious fuel shortages, and that the Swedish Forest Service has already taken action toward a sharp restriction of timber production for many years in the future. These reports, emanating from government sources, may be considered with some reservation, but to a certain extent they probably are true.

NINE PAGES of interesting tables and charts on Pulp Production, Pulpmaking Capacities, Pulp Imports and Export and Pulp Prices complete this section. Please turn to the following pages for these features.

SOURCES OF U. S. WOOD PULP IMPORTS IN PERCENTAGES

Year	From Sweden	From Canada	Other
1939	43%	31%	26%
1940	23%	68%	9%
1941-44		100%	nil
1945	38%	62%	nil
1946	25%	69%	6%

Source: Department of Commerce.

On the basis of data from a Swedish trade journal, Sweden exported to the world 1,858,927 short tons of wood pulp in 1946. Of this amount, 374,829 short tons or 20 per cent were listed as exported to the United States. These exports are not to be compared with *entries* of pulp into the United States for 1946 which amounted to 433,000 tons, which includes entries received here in 1946 but shipped from Sweden in 1945.

SWEDISH PULP EXPORTS TO U. S.

	—In Tons— 1946	1945
Groundwood	8,777	27,933
Bleached sulfite	23,315	56,496
Unbleached sulfite	151,261	283,959
Bleached sulfate	22,772	28,070
Unbleached sulfate	168,704	274,429
Total	374,829	670,887

Source: Swedish trade journal for 1946, U. S. Dept. of Commerce for 1945. The 1946 figure for amount of pulp which arrived in U. S. is somewhat larger than the amount shipped from Sweden bound for U. S. in that year.

U.S. IMPORTS OF OVERSEAS WOOD PULP—JAN. 4 THROUGH DEC. 26, 1946

	Quantity Short Tons	Value* Dollars
Groundwood	27,561	1,341,961
Sulfite, unbleached	189,585	12,981,498
Sulfite, rayon and special	10,838	1,069,629
Sulfite, other bleached	28,484	2,308,558
Sulfate, unbleached	254,796	16,547,620
Sulfate, bleached	22,519	1,924,245
Total	533,783	36,173,511

Source: Data supplied by the Bureau of the Census. *Value is usually foreign or export value in principal market of exporting country.

SWEDEN'S PULP EXPORTS

(In short tons)

	—To All Countries— 1945	1944	To U. S. 1945	% to U. S. 1945
Mechanical, wet	260,118	1,067	27,933	8%
Mechanical, dry	53,936	9,523		
Sulfite pulp, bleached	262,146	156,340	56,496	21%
Sulfite pulp unbleached, wet	43,987	2,720	283,959	48%
Sulfite pulp unbleached, dry	527,090	47,067		
Sulfate pulp bleached	43,273	13,088	28,070	65%
Sulfate pulp unbleached, wet	31,078	10,346	274,429	51%
Sulfate pulp unbleached, dry	505,066	60,543		

Source: Total exports from Svensk Pappers Tidning; U. S. shipments (none arrived until June 25, 1945) from U. S. Dept. of Commerce (to Jan. 3, 1946).

SWEDISH WOOD PULP IMPORTS BY U. S. (1931-39)

(Source: Foreign Commerce and Navigation of the U. S.—Monthly and Annual)

By Months	Average 1931-1935 Tons	Index	Average 1936-1939 Tons	Index	Average 1931-1939 Tons	Index
January	106,472	163.00	98,052	123.03	102,729	143.26
February	68,227	104.45	74,594	93.60	71,057	99.09
March	30,083	46.06	44,043	55.27	36,287	50.60
April	13,643	20.89	16,662	20.91	14,984	20.90
May	38,030	58.22	70,081	87.94	52,275	72.90
June	59,668	91.35	100,151	125.67	77,660	108.30
July	64,081	98.11	87,203	109.42	74,358	103.69
August	68,155	104.34	92,487	116.05	78,969	110.13
September	69,306	106.10	84,643	106.21	76,123	106.16
October	82,026	125.58	86,638	108.71	84,076	117.25
November	93,563	143.24	104,802	131.51	98,558	137.44
December	90,572	138.66	96,975	121.68	93,418	130.28
Year	783,826	100.	956,331	100.	860,494	100.
By Quarters						
First	204,782	104.50	216,689	90.64	210,073	97.65
Second	111,341	56.82	186,894	78.17	144,919	67.37
Third	201,542	102.85	264,333	110.56	229,450	106.66
Fourth	266,161	135.83	288,415	120.63	276,052	128.32
Year	783,826	100.	956,331	100.	860,494	100.

FINLAND'S EXPORTS OF CHEMICAL PULP

(In short tons, dry weight)

	—1946— Sulfite tons	Sulfate tons	—1945— Sulfite tons	Sulfate tons	—1944— Sulfite tons	Sulfate tons
Soviet Union	.....	.....	106,050	67,365	6,735	7,986
Britain	.....	.....	39,358	19,531	.....	.....
U. S. A.	.....	.....	4,980	5,891	.....	.....
France	.....	.....	.....	.....	3,423	1,872
Holland	.....	.....	.....	.....	1,070	774
Germany	.....	.....	.....	.....	62,468	40,699
Denmark	.....	.....	7,320	9,749	18,624	13,613
South America	.....	.....	753	.....	.....	.....
Other	.....	.....	1,239	1,922	7,752	3,891
Total	223,287	199,459	159,700	104,458	100,072	68,835

Source: Finnish Paper & Timber Journal.

These tables were issued by U. S. Pulp Producers Association. All figures are in short tons. U. S. government figures are used for production and consumption of major grades and for imports, exports, (except for 1944 and two months for 1945 and Dec. 1946) and inventories. The association compiled capacity data and domestic shipments from its own reports. It also incorporated its own production and consumption and inventory estimates for dissolving and semi-chemical (non-paper) grades.

TOTAL WOOD PULP

	1944	1945	1946	'45-'46% Change
Capacity	11,800,000	11,994,059	12,127,164	+ 1
Consumption	11,066,204	11,365,412	12,560,500	+ 10½
New Supply	10,961,654	11,785,268	12,360,028	+ 5
Production	10,108,443	10,167,200	10,605,225	+ 4
Imports	1,071,623	1,754,065	1,794,562	+ 2
Shipments	1,713,427	1,587,069	1,334,911	— 16
Export	218,412	135,997	39,759	— 71
Domestic	1,495,015	1,451,072	1,295,152	— 11
Inv. 1/1	427,000	333,000	750,000	+125
Inv. 12/31	333,000	750,000	550,000	— 27
Inv. Change	—94,000	+417,000	—200,000	

TOTAL CHEMICAL PULP

	1944	1945	1946	'45-'46% Change
Capacity	8,907,512	9,049,411	9,160,237	+ 1
Consumption	8,558,096	8,754,999	9,721,157	+ 11
New Supply	8,466,312	9,154,439	9,530,485	+ 4
Production	7,795,014	7,763,789	8,021,019	+ 3
Imports	889,710	1,526,647	1,549,225	+ 1
Shipments	1,662,554	1,533,718	1,264,015	— 18
Export	218,412	135,997	39,759	— 71
Domestic	1,444,142	1,397,721	1,224,256	— 12½
Inv. 1/1	365,000	290,000	689,000	+137½
Inv. 12/31	290,000	689,000	492,500	— 29
Inv. Change	—75,000	+299,000	—196,500	

TOTAL MECHANICAL PULP*

	1944	1945	1946	'45-'46% Change
Capacity	2,892,488	2,944,648	2,966,927	+ 1
Consumption	2,508,108	2,610,413	2,839,343	+ 9
New Supply	2,495,342	2,630,829	2,829,543	+ 7½
Production	2,313,429	2,403,411	2,584,206	+ 7½
Imports	181,913	227,418	245,337	+ 8
Shipments	50,873	53,351	70,896	+ 33
Export	0	0	0	0
Domestic	50,873	53,351	70,896	+ 33
Inv. 1/1	62,000	43,000	61,000	+ 42
Inv. 12/31	43,000	61,000	57,500	— 6
Inv. Change	—19,000	+18,000	—3,500	

*Includes Groundwood, Defibrated, Exploded and Asplund pulp, and mechanical screenings.

TOTAL SULFITE PULP

	1944	1945	1946	'45-'46% Change
Capacity	2,906,740	2,880,195	2,907,724	+ 1
Consumption	3,082,590	3,123,108	3,594,578	+ 15
New Supply	3,010,768	3,348,364	3,488,138	+ 4
Production	2,386,149	2,359,731	2,477,236	+ 5
Imports	720,050	1,045,753	1,043,617	0
Shipments	1,038,471	996,891	963,082	— 3
Export	95,431	57,120	32,715	— 43
Domestic	943,040	939,771	930,367	— 1
Inv. 1/1	256,000	196,000	416,000	+112
Inv. 12/31	196,000	416,000	282,000	— 32
Inv. Change	—60,000	+220,000	—134,000	

TOTAL BLEACHED SULFITE PULP

	1944	1945	1946	'45-'46% Change
Capacity	1,811,368	1,817,850	1,953,912	+ 7
Consumption	1,840,624	1,885,780	2,117,570	+ 12
New Supply	1,794,662	1,902,304	2,101,396	+ 10
Production	1,523,221	1,543,762	1,692,053	+ 10
Imports	320,632	388,456	425,028	+ 9
Shipments	798,507	764,229	793,736	+ 4
Export	49,191	29,914	15,685	— 48
Domestic	749,316	734,315	778,051	+ 6
Inv. 1/1	184,000	152,000	163,000	+ 7
Inv. 12/31	152,000	163,000	147,000	— 10
Inv. Change	—32,000	+11,000	—16,000	

PAPER GRADES OF BLEACHED SULFITE PULP

	1944	1945	1946	'45-'46% Change
Consumption	1,276,624	1,345,780	1,612,235	+ 20
New Supply	1,243,345	1,413,488	1,609,326	+ 14
Production	1,093,676	1,187,945	1,393,579	+ 17
Imports	188,131	242,424	222,653	— 8
Shipments	370,178	401,177	498,252	+ 24
Export	38,462	16,881	6,906	— 59
Domestic	331,716	384,296	491,346	+ 28
Inv. 1/1	46,000	28,000	90,000	+221
Inv. 12/31	28,000	90,000	87,000	— 3
Inv. Change	—18,000	+62,000	—3,000	

DISSOLVING and SPECIAL CHEMICAL GRADES of BLEACHED SULFITE PULP

	1944	1945	1946	'45-'46% Change
Consumption	564,000	540,000	505,335	— 6½
New Supply	551,317	488,816	592,070	+ 1
Production	429,545	355,817	298,474	— 16
Imports	132,501	146,032	202,375	+ 38½
Shipments	428,329	363,052	295,484	— 19
Export	10,729	13,033	8,779	— 33
Domestic	417,600	350,019	286,705	— 18
Inv. 1/1	138,000	124,000	73,000	— 41
Inv. 12/31	124,000	73,000	60,000	— 18
Inv. Change	—14,000	—51,000	—13,000	

UNBLEACHED SULFITE PULP

	1944	1945	1946	'45-'46% Change
Capacity	1,095,372	1,062,345	953,812	— 10
Consumption	1,241,966	1,237,328	1,477,008	+ 19
New Supply	1,216,106	1,446,060	1,386,742	— 4
Production	862,928	815,969	785,183	— 4
Imports	399,418	657,297	618,589	— 6
Shipments	239,964	232,662	169,346	— 27
Export	46,240	27,206	17,030	— 37½
Domestic	193,724	205,456	152,316	— 26
Inv. 1/1	72,000	44,000	253,000	+475
Inv. 12/31	44,000	253,000	135,000	— 47
Inv. Change	—28,000	+209,000	—118,000	

These tables were issued by U. S. Pulp Producers Association. All figures are in short tons. U. S. government figures are used for production and consumption of major grades and for imports, exports, (except for 1944 and two months of 1945 and Dec. 1946) and inventories. The association compiled capacity data and domestic shipments from its own reports. It also incorporated its own production and consumption and inventory estimates for dissolving and semi-chemical (non-paper) grades.

TOTAL SULFATE PULP

	1944	1945	1946	'45-'46% Change
Capacity	5,161,694	5,298,790	5,377,079	+ 1
Consumption	4,588,463	4,679,896	5,148,204	+ 10
New Supply	4,582,455	4,858,188	5,064,702	+ 4
Production	4,548,810	4,471,875	4,592,786	+ 3
Imports	146,015	452,428	477,603	+ 5½
Shipments	489,918	410,891	182,929	— 55½
Export	112,370	66,115	5,687	— 91
Domestic	377,548	344,776	177,242	— 49
Inv. 1/1	67,000	66,000	246,000	+273
Inv. 12/31	66,000	246,000	186,500	— 24
Inv. Change	—1,000	+180,000	—59,500	

SODA PULP

	1944	1945	1946	'45-'46% Change
Capacity	481,653	494,866	493,879	0
Consumption	418,442	440,396	488,759	+ 11
New Supply	418,578	439,947	491,595	+ 12
Production	412,755	429,757	472,000	+ 10
Imports	16,404	21,157	19,740	— 7
Shipments	107,273	94,637	85,949	— 9
Export	10,581	10,967	145	— 99
Domestic	96,692	83,670	85,804	+ 2½
Inv. 1/1	15,000	16,000	16,000	0
Inv. 12/31	16,000	16,000	16,500	+ 3
Inv. Change	+1,000	0	+500	

BLEACHED SULFATE PULP

	1944	1945	1946	'45-'46% Change
Capacity	699,875	783,344	881,840	+ 12½
Consumption	713,747	756,129	837,130	+ 11
New Supply	705,707	771,467	827,777	+ 7
Production	664,946	705,104	753,544	+ 7
Imports	47,458	71,996	75,062	+ 4
Shipments	96,432	112,817	47,060	— 58
Export	6,697	5,633	829	— 85
Domestic	89,735	107,184	46,231	— 57
Inv. 1/1	24,000	22,000	39,000	+ 77
Inv. 12/31	22,000	39,000	36,000	— 8
Inv. Change	—2,000	+17,000	—3,000	

SEMICHEMICAL PULP

	1944	1945	1946	'45-'46% Change
Capacity	357,425	375,795	.....	.....
Consumption	307,619	532,859	510,517	— 4
New Supply	307,619	529,200	506,951	— 4
Production	307,619	518,978	493,997	— 5
Imports	0	12,017	14,166	+ 18
Shipments	701	32,008	33,055	+ 3
Exports	0	1,795	1,212	— 32½
Domestic	701	30,213	31,843	+ 5
Inv. 1/1	0	14,000	11,000	— 21½
Inv. 12/31	0	11,000	7,500	— 32
Inv. Change	0	—3,000	—3,500	

SEMIBLEACHED SULFATE PULP

	1944	1945	1946	'45-'46% Change
Capacity	171,165	166,430	166,700	0
Consumption	156,085	168,231	185,188	+ 10
New Supply	156,262	168,540	183,699	+ 9
Production	144,262	148,540	152,337	+ 2½
Imports	12,000	20,000	31,362	+ 57
Shipments	9,876	6,201	1,624	— 74
Export	0	0	0	0
Domestic	9,876	6,201	1,624	— 74
Inv. 1/1	4,000	5,000	6,000	+ 20
Inv. 12/31	5,000	6,000	4,500	— 25
Inv. Change	+1,000	+1,000	—1,500	

GROUNDWOOD PULP

	1944	1945	1946	'45-'46% Change
Capacity	2,177,114	2,205,237	2,195,538	0
Consumption	1,830,175	1,904,830	2,055,295	+ 8
New Supply	1,815,648	1,918,894	2,048,443	+ 7
Production	1,638,761	1,696,184	1,809,007	+ 7
Imports	176,887	222,710	239,436	+ 7½
Shipments	50,055	50,642	55,515	+ 5
Export	0	0	0	0
Domestic	50,055	52,642	55,515	+ 5
Inv. 1/1	61,000	41,000	55,000	+ 34
Inv. 12/31	41,000	55,000	56,000	+ 2
Inv. Change	—20,000	+14,000	+1,000	

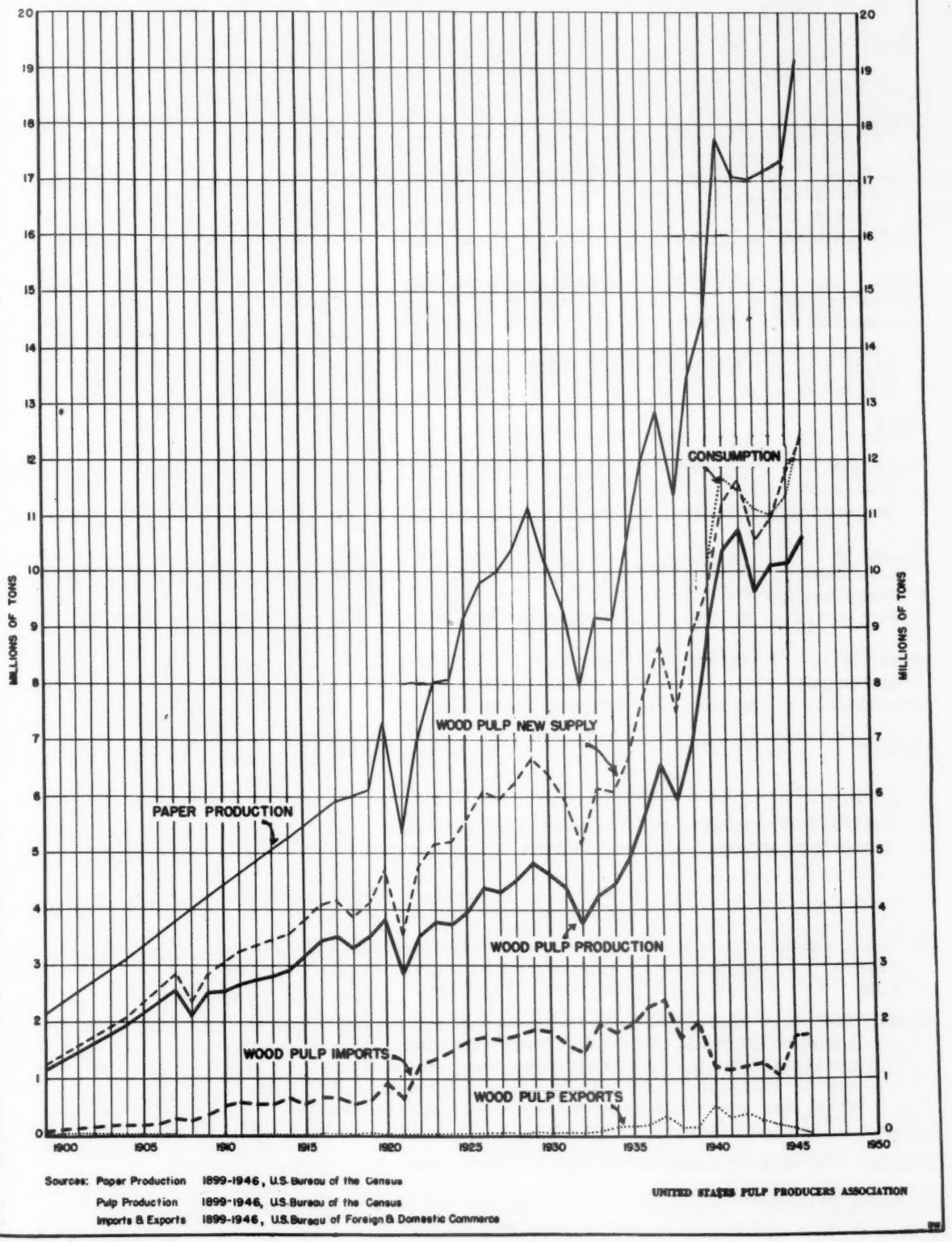
UNBLEACHED SULFATE PULP

	1944	1945	1946	'45-'46% Change
Capacity	4,290,654	4,348,781	4,328,539	0
Consumption	3,718,631	3,755,536	4,125,886	+ 10
New Supply	3,720,486	3,918,181	4,053,226	+ 3
Production	3,739,602	3,618,231	3,686,905	+ 2
Imports	86,557	360,432	371,179	+ 3
Shipments	383,610	291,873	134,245	— 54
Export	105,673	60,482	4,858	— 92
Domestic	277,937	231,391	129,387	— 44
Inv. 1/1	39,000	39,000	201,000	+415
Inv. 12/31	39,000	201,000	146,000	— 27
Inv. Change	0	+162,000	—55,000	

DEFIBRATED, EXPLODED and ASPLUND FIBER

	1944	1945	1946	'45-'46% Change
Capacity	660,933	739,411	771,389	+ 4
Consumption	662,668	684,323	763,197	+ 11½
New Supply	662,668	690,675	760,199	+ 10
Production	0	690,675	760,199	+ 10
Imports	0	0	0	
Shipments	0	0	14,381	
Export	0	0	0	
Domestic	0	0	14,381	
Inv. 1/1	1,000	0	6,000	
Inv. 12/31	2,000	6,000	1,500	— 75
Inv. Change	+1,000	+6,000	—4,500	

TOTAL UNITED STATES PRODUCTION OF WOOD PULP AND PAPER
AND
NEW SUPPLY, CONSUMPTION, IMPORTS AND EXPORTS OF WOOD PULP



Sources: Paper Production 1899-1946, U.S. Bureau of the Census
Pulp Production 1899-1946, U.S. Bureau of the Census
Imports & Exports 1899-1946, U.S. Bureau of Foreign & Domestic Commerce

UNITED STATES PULP PRODUCERS ASSOCIATION

UNITED STATES WOOD PULP PRODUCING CAPACITY BY REGIONS

(In tons of 2,000 pounds)

1945	New Eng.	Mid. Atl.	Lake	Pacific	South	Total
Sulphite	616,480	323,894	661,743	1,151,648	126,430	2,880,195
Bleached*	373,600	177,620	429,163	711,037	126,430	1,817,850*
Unbleached	242,880	146,274	232,580	440,611	0	1,062,345
Sulphate	32,310	80,505	321,250	474,344	4,390,146	5,298,555
Bleached*	0	70,590	36,910	57,480	618,364	783,344*
Semibleached	0	0	29,000	20,000	117,430	166,430
Unbleached	32,310	9,915	255,340	396,864	3,654,352	4,348,781
Soda	143,295	162,512	54,004	9,360	125,695	494,866
Semichemical	0	450	2,310	40,200	332,835	375,795
Groundwood	770,770	386,531	517,473	331,613	198,850	2,205,237
Total**	1,562,855	953,892	1,556,780	2,007,165	5,173,956	11,254,648**
1946						
Sulphite	625,980	333,392	660,918	1,190,981	121,125	2,932,396
Bleached*	394,695	179,800	454,214	756,832	121,125	1,906,666*
Unbleached	231,285	153,592	206,704	434,149	0	1,025,730
Sulphate	38,530	81,440	331,237	469,600	4,393,585	5,314,392
Bleached*	0	70,590	36,500	95,780	631,580	834,450*
Semibleached	0	0	32,103	32,300	84,060	148,463
Unbleached	38,530	10,850	262,634	341,520	3,677,945	4,331,479
Soda	145,825	162,568	53,348	9,360	123,695	494,796
Semichemical	0	895	10,080	39,270	331,310	381,555
Groundwood	767,642	374,498	509,745	333,763	209,890	2,195,538
Total**	1,577,977	952,793	1,565,328	2,042,974	5,179,605	11,318,677**

* The following additional bleached capacity, used for producing semibleached or unbleached grades, has been included in those grades:

	1945	1946
Sulphite	116,427	47,246
Sulphate	286,722	283,122

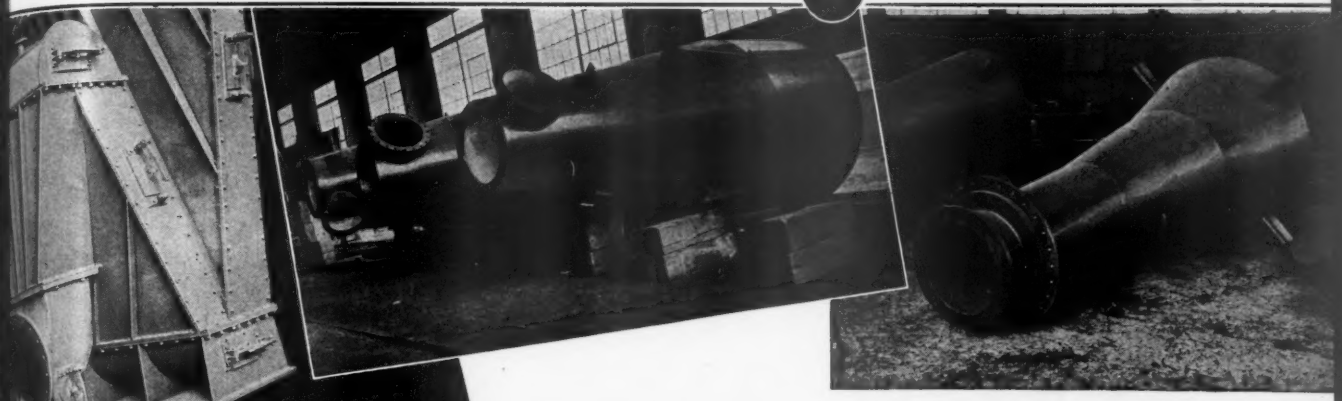
** Does not include the following capacity for defibrated, exploded and asplund fiber.

1945	33,937	85,100	143,250	15,000	462,124	739,411
1946	34,112	86,100	157,405	15,000	478,772	771,389

Note: The above capacity figures are for normal annual capacity (with adequate supplies of wood, labor and transportation), based on daily rated capacity multiplied by the number of days per year each mill is normally operated. New or additional capacity has been included for that period of the year after the announced date for completed additions.

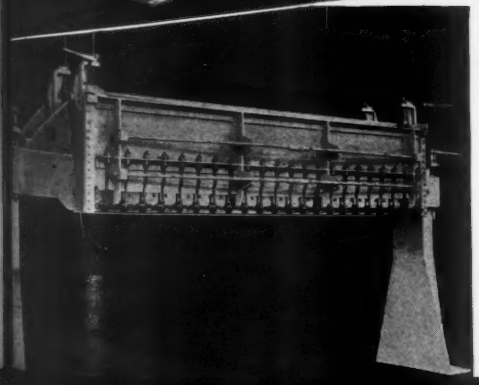
Source: Surveys of Capacity by United States Pulp Producers Association

PAPER · · · America's 6th Industry









GIVING "WINGS" TO PRODUCTION

Here is the stock handling equipment that gives "wings" to production in the new Puseyjones Machines. Look at these fabricated steel weldments, custom-built to meet the requirements of tonnage, trim and product. Here are Flow-Spreaders, Flow Boxes, Slices, Up-Flow Head Boxes, Secondary Head Boxes—all stainless clad or Neoprene lined—and all designed to smooth the stock approach to the wire.

The improved stock handling built into each new Puseyjones Machine is a result of the lessons learned in four years of war-time research and development, combined with expert craftsmanship. Result: better quality and bigger tonnages for you.

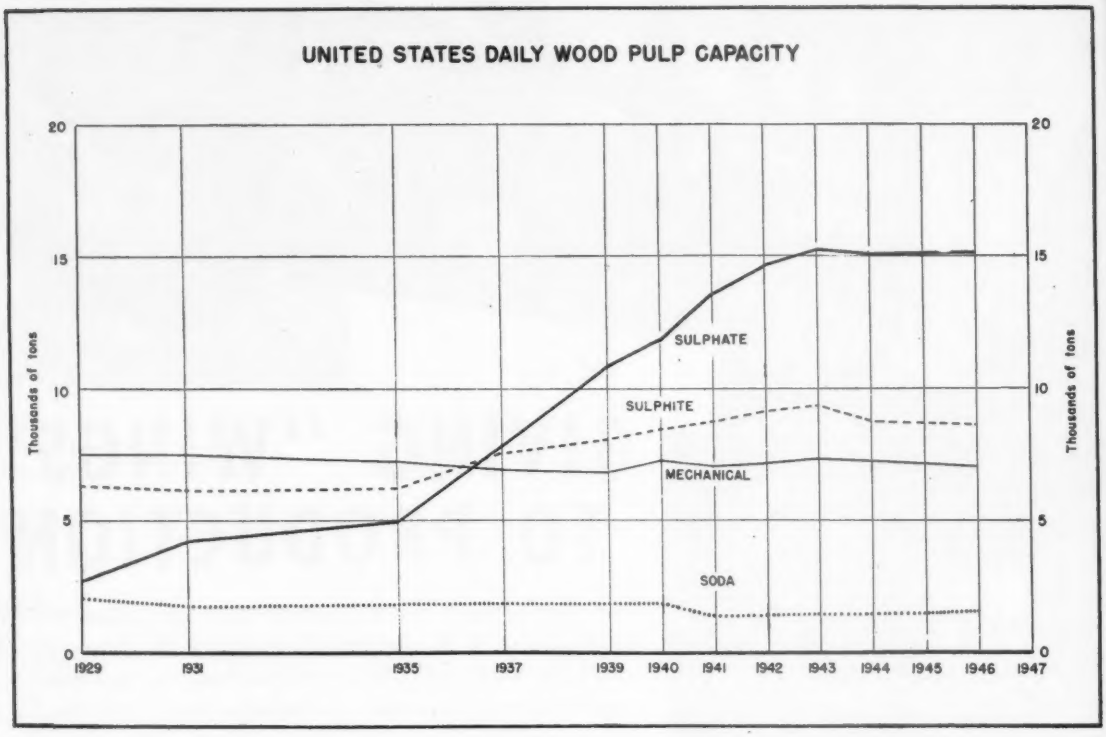
Among the new machines under construction by Puseyjones are three of the largest and fastest Fourdrinier Machines, one for white paper for bags, one for Kraft liner board, and one for Kraft paper for multi-wall bags; also one Cylinder machine of record size and speed for the manufacture of floor covering felt. Other machines are under construction for the manufacture of M. G. Kraft specialties, facial tissues, and high grade bristols.

During the next few months these machines will go into production in North Carolina, Massachusetts, Florida, Georgia, New York and California, as well as in Mexico and Sweden.

Puseyjones Engineers will welcome the opportunity to work with you in solving production problems.

THE PUSEY AND JONES CORPORATION
Established 1848. Builders of Paper-Making Machinery
Wilmington 99, Delaware, U. S. A.

THE SIGN OF TRADE MARK SUPERIOR QUALITY



Total Rated Capacity per 24 Hours (In tons of 2000 pounds)

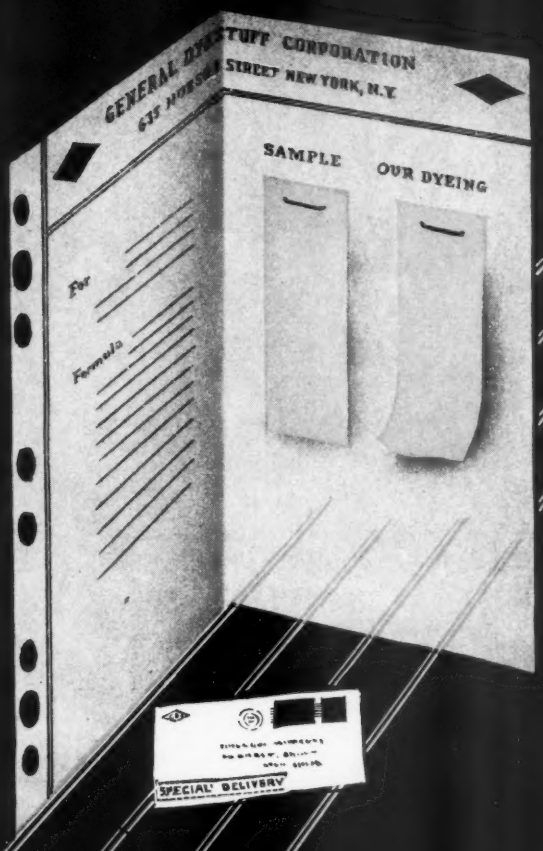
	Sulphite	Sulphate	Soda	Semi-Chemical	Mechanical	Total*
1929	6,357	2,740	2,037	155**	7,587	18,876
1931	6,115	4,224	1,751	320**	7,524	19,934
1935	6,243	4,926	1,841	320**	7,217	20,547
1937	7,558	7,852	1,830	433**	6,973	24,646
1939	8,145	10,866	1,814	499	6,848	28,172
1940	8,464	11,853	1,922	592	7,251	30,082
1941	8,754	13,578	1,410	637	7,084	31,463
1942	9,112	14,609	1,475	687	7,184	33,067
1943	9,303	15,230	1,462	734	7,328	34,057
1944	8,798	15,044	1,461	1,063	7,228	33,594
1945	8,693	15,077	1,465	1,063	7,115	33,413
1946	8,641	15,139	1,529	1,115	7,022	33,446

* Data do not include capacity for defibrated, exploded and asplund fiber.

** Estimated from Government figures which combined capacity for Semi-chemical wood pulp with capacity for cotton linters, rag pulp, etc.

Sources: 1929-1940, United States Bureau of the Census
1941-1946, United States Pulp Producers Association's Surveys of capacity as of the first of each year.

Color Matching Service



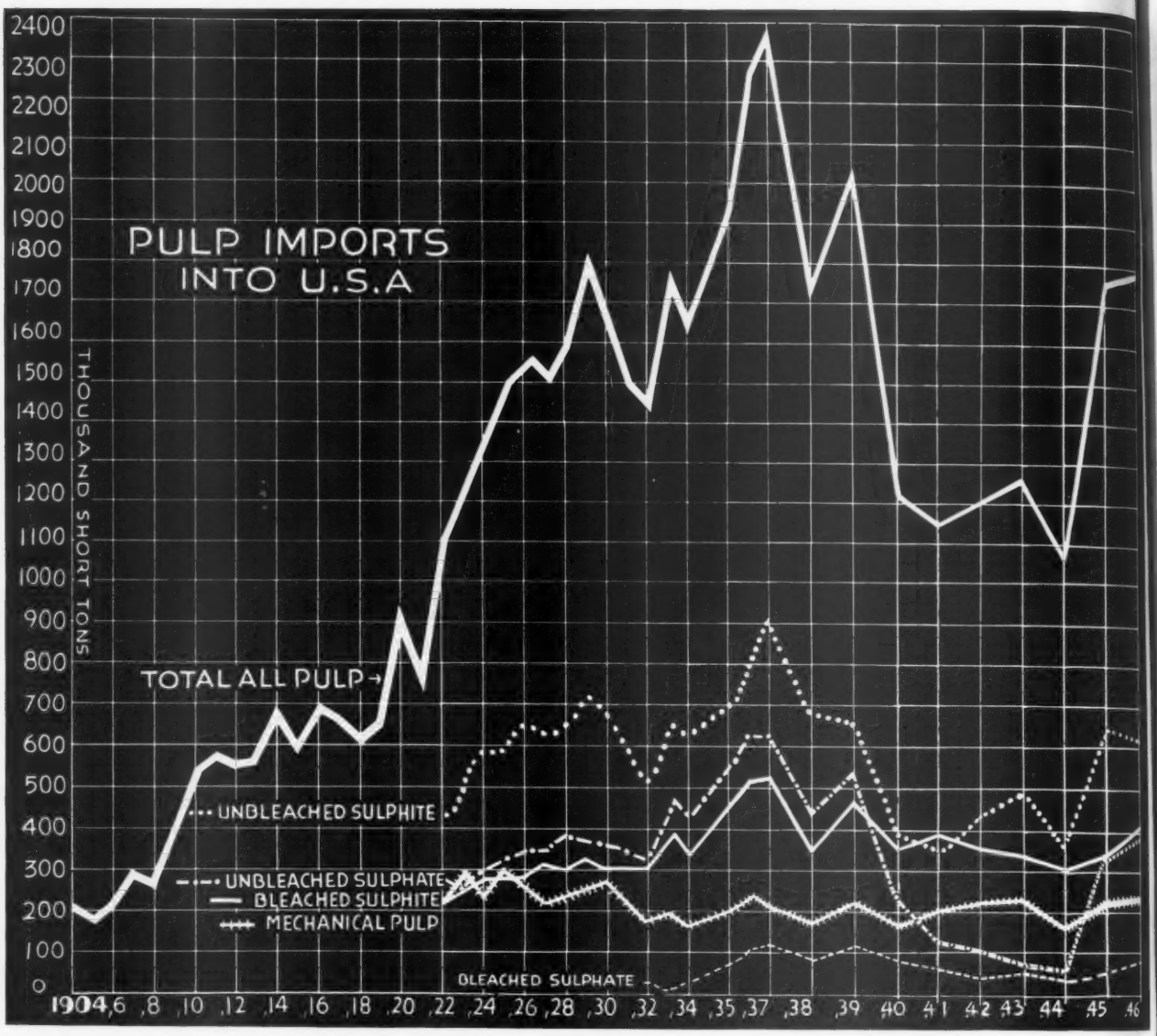




The General Dyestuff Corporation's Quick Color Matching Service is tuned to meet today's needs. Color matches are mailed to you the same day your request is received . . . formulas sent by wire or telephone at your request. We invite you to take advantage of our Quick Color Matching Service.

GENERAL DYESTUFF CORPORATION

435 HUDSON STREET · NEW YORK 14, N. Y.



UNITED STATES WOOD PULP IMPORTS (Exports Table on Page 171)

	Chemical Pulp		Mechanical Pulp		Total Pulp	
	Short Tons	Value	Short Tons	Value	Short Tons	Value
1946	1,555,126	.....	239,436	.....	1,794,562	.....
1945	1,324,000	.....	222,000	.....	1,752,000	.....
1944	895,000	.....	177,000	.....	1,072,000	.....
1940	1,054,000	$55,481,017	171,000	.....	1,225,000	$60,193,666
1937	2,176,343	93,955,854	218,422	4,342,168	2,394,765	98,298,022
1922	1,043,832	57,600,844	215,810	5,706,529	1,259,642	63,307,373

Source: Bureau of the Census. Detail may not add because screenings are not listed separately, but are included in totals.

PACIFIC COAST PULP PRODUCTION—1931-1946

(Tons of 2,000 lbs.)

	1931 Tons	1932 Tons	1933 Tons	1934 Tons	1935 Tons	1936 Tons	1937 Tons	1938 Tons
Washington	580,016	420,529	583,770	709,380	775,722	895,797	1,184,390	836,959
Oregon and California	237,532	187,133	189,332	240,167	262,221	302,634	338,802	250,788
British Columbia	310,029	259,586	343,897	383,818	377,522	416,433	425,558	242,020
Total Pacific Coast	**1,127,577**	**867,248**	**1,117,999**	**1,333,365**	**1,415,465**	**1,614,864**	**1,948,750**	**1,329,767**

	1939 Tons	1940 Tons	1941† Tons	1942* Tons	1943* Tons	1944* Tons	1945 Tons	1946 Tons
Washington	1,107,318	1,443,121	1,475,671	1,572,841	1,153,177	1,256,374	1,265,436	1,332,940
Oregon and California	270,829	396,142	518,479	421,154	403,306	412,342	372,939	420,408
British Columbia	321,132	445,564	494,811	448,272	385,875	465,787	463,150	542,568
Total Pacific Coast	**1,699,279**	**2,284,827**	**2,488,861**	**2,442,267**	**1,942,358**	**2,134,503**	**2,101,525**	**2,295,916**

Source—U. S. figures up to 1940 and in 1945, from U. S. Dept. of Commerce, Bureau of Census; B. C. figures from Dept. of Lands, Forest Branch: and Dominion Bureau of Statistics.

‡ Figures based upon United States Pulp Producers Association total for Oregon and Washington. Division of production between Oregon and Washington estimated by PULP & PAPER Industry. No wood pulp production in California. British Columbia 1946 figure estimated by PULP & PAPER Industry.

*U. S. figures from War Production Board.



The New KVP Mill at Espanola, Ontario

KVP

Makers and Converters of PARCHMENT • WAXED • WRAPPING
GREASEPROOF • LAMINATED • BOND • HOUSEHOLD PAPERS
Specialists in FOOD PROTECTION PAPERS

THE KVP COMPANIES

KVP Company of Texas
Houston, Texas

Harvey Paper Products Company
Sturgis, Michigan

Aridor, Limited
Hamilton, Ontario

The KVP Company Limited
Espanola, Ontario

Appleford Paper Products Limited
Hamilton, Ontario
Montreal, Quebec

Kalamazoo Vegetable Parchment Company

PARCHMENT, MICHIGAN DEVON, PENNSYLVANIA

U. S. IMPORTS OF WOOD PULP

By Countries, 1945-1946

(From U. S. Pulp Producers Assn., based on Dept. of Commerce reports)

Total All Grades

From:	All Countries		Canada		Sweden		Finland	Newfoundland	
	1945	1946	1945	1946	1945	1946	1946	1945	1946
Year	1,754,065	1,794,562	1,079,014	1,233,349	672,261	445,124	115,220	2,790	869
1st 6 mos.	521,645	877,278	519,415	602,631	2,230	234,948	38,830	0	869
2nd 6 mos.	1,232,420	917,284	559,599	630,718	670,031	210,176	76,390	2,790	0

Mechanical Pulp

Year	222,710	239,436	194,275	209,827	27,845	14,429	14,980	590	200
1st 6 mos.	94,834	121,207	94,834	112,873	0	8,134	0	0	200
2nd 6 mos.	127,876	118,229	99,441	96,954	27,845	6,295	14,980	590	0

Rayon and Special Grades of Bleached Sulfite

From:	All Countries		Canada		Sweden		Finland
	1945	1946	1945	1946	1945	1946	1946
Year	146,032	202,375	142,399	189,958	3,633	10,978	1,439
1st 6 mos.	68,409	106,413	66,179	98,867	2,230	7,546	0
2nd 6 mos.	77,623	95,962	76,220	91,091	1,403	3,432	1,439

Paper Grades of Bleached Sulfite

Year	242,424	222,653	190,187	195,112	52,237	17,193	10,348
1st 6 mos.	90,714	125,553	90,714	112,273	0	9,331	3,949
2nd 6 mos.	151,710	97,100	99,473	82,839	52,237	7,862	6,399

Unbleached Sulfite

From:	All Countries		Canada		Sweden		Finland	Newfoundland	
	1945	1946	1945	1946	1945	1946	1946	1945	1946
Year	657,297	618,589	370,151	410,861	285,018	172,181	34,878	2,128	669
1st 6 mos.	182,666	280,408	182,666	179,050	0	85,901	14,788	0	669
2nd 6 mos.	474,631	338,181	187,485	231,811	285,018	86,280	20,090	2,128	0

Unbleached Sulfate

Year	380,432	397,906	104,107	137,472	276,253	206,859	53,575	72	0
1st 6 mos.	47,116	188,962	47,116	52,781	0	116,088	20,093	0	0
2nd 6 mos.	333,316	208,944	56,991	84,691	276,253	90,771	33,482	72	0

Bleached Sulfate

From:	All Countries		Canada		Sweden	
	1945	1946	1945	1946	1945	1946
Year	71,996	79,697	44,760	56,213	27,236	23,484
1st 6 mos.	22,891	35,678	22,891	27,730	0	7,948
2nd 6 mos.	49,105	44,019	21,869	28,483	27,236	15,536

	Soda				All Screenings			
From:	All Countries		Canada		All Countries		Canada	
	1945*	1946	1945	1946	1945	1946	1945	1946
Year	21,157	19,740	21,118	19,740	12,017	14,166	12,017	14,166
1st 6 mos.	10,214	11,156	10,214	11,156	4,801	7,901	4,801	7,901
2nd 6 mos.	10,943	8,584	0,904	8,584	7,216	6,265	7,216	6,265

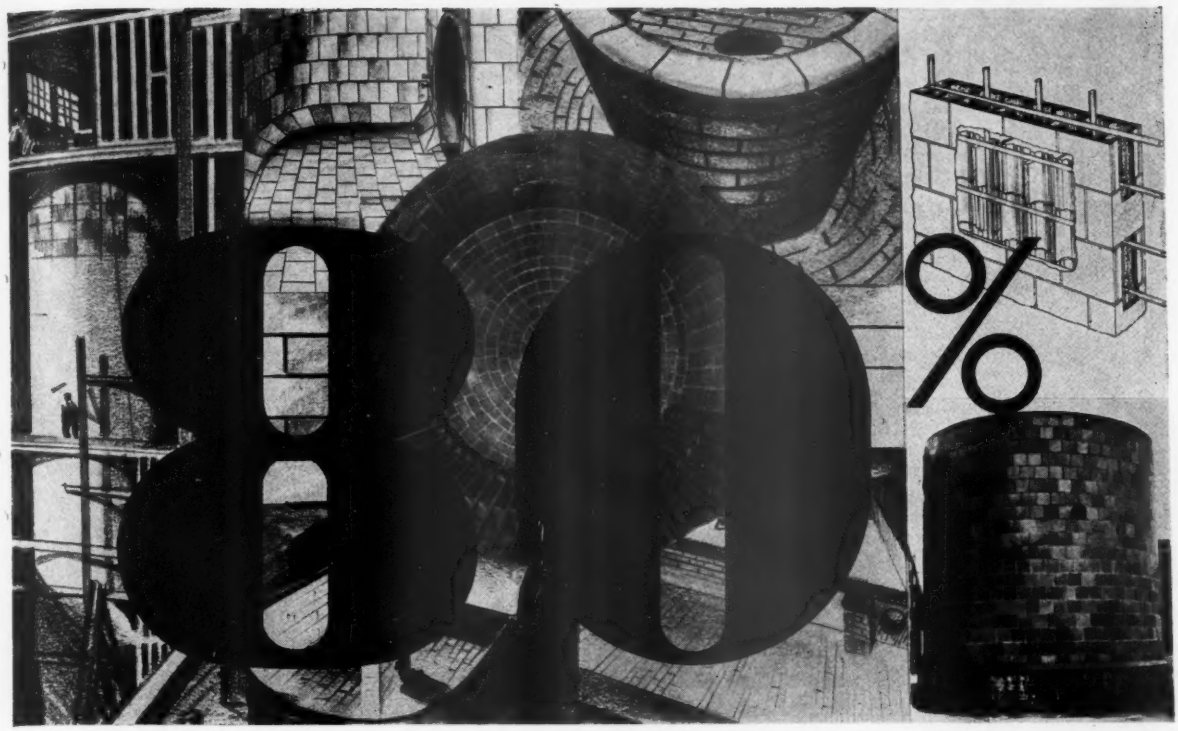
*39 tons of the Soda reported to have come from Sweden.

U. S. PACIFIC COAST WOOD PULP PRODUCTION, 1923-1946

Tons of 2,000 lbs.

1923	299,596	1931	817,548	1939	1,384,147
1924	309,433	1932	607,662	1940	1,839,263
1925	322,594	1933	773,102	1941	1,994,150
1926	378,005	1934	935,033	1942	1,968,658
1927	449,218	1935	1,011,421	1943	1,521,531
1928	562,514	1936	1,198,431	1944	1,644,531
1929	780,494	1937	1,523,192	1945	1,591,789
1930	815,089	1938	1,087,747	1946	1,694,959

—Source: U. S. Pulp Producers Assn.



OF ALL CHEMICAL PULP MADE ON THIS CONTINENT IS PROCESSED AT SOME STAGE OF ITS MANUFACTURE IN EQUIPMENT BUILT OR LINED BY STEBBINS.

Let us demonstrate the superiority of Stebbins lining and tile tank service the next time you line a new vessel or reline an old one.

SEMCO

Stebbins Engineering Corporation

TEXTILE TOWER SEATTLE 1, WASHINGTON

CANADIAN PULP PRODUCTION

(Tons of 2,000 lbs.)

	Mechanical Tons	Sulphite Tons	Sulphate[1] Tons	Total Tons
1920	1,090,114	654,273	188,487	1,922,774
1921	931,560	476,929	131,337	1,539,826
1922	1,241,185	678,878	217,862	2,137,925
1923	1,449,106	749,668	224,812	2,413,586
1924	1,427,782	768,035	218,207	2,414,024
1925	1,621,917	842,785	242,207	2,706,909
1926	1,901,268	995,203	256,074	3,152,545
1927	1,922,124	1,016,060	262,512	3,200,696
1928	2,127,699	1,117,227	256,969	3,501,895
1929	2,420,774	1,236,232	250,104	3,907,110
1930	2,283,130	1,076,804	188,253	3,548,187
1931	2,016,480	941,586	145,156	3,103,222
1932	1,696,021	941,579	144,367	2,781,967
1933	1,859,049	937,313	182,988	2,979,350
1934	2,340,441	1,020,493	205,980	3,566,914
1935	2,458,000	1,025,000	206,000	3,689,000
1936	2,910,338	1,168,927	273,494	4,352,759
1937	3,308,517	1,373,232	312,741	4,994,490
1938	2,650,000	925,000	258,000	3,833,000
1939	2,738,011	1,028,820	313,628	4,080,459
1940	3,305,484	1,480,545	399,267	5,290,762
1941	3,494,922	1,664,516	426,743	5,720,847
1942	3,260,097	1,753,453	459,254	5,472,804
1943	2,998,913	1,712,571	441,421	5,152,905
1944	3,076,296	1,609,629	467,726	5,153,651
1945	3,341,920	1,639,684	478,740	5,460,344
1946*	3,995,000	1,830,000	560,000	6,385,000

[1]Prior to 1939 the sulphate totals included sulphate pulps only. 1939, 1940 and 1941 sulphate totals include soda and other pulp, according to the Dominion Bureau of Statistics.
*Estimated. For all other years figures are official. 1946 estimates from "Mill Stock Reporter."

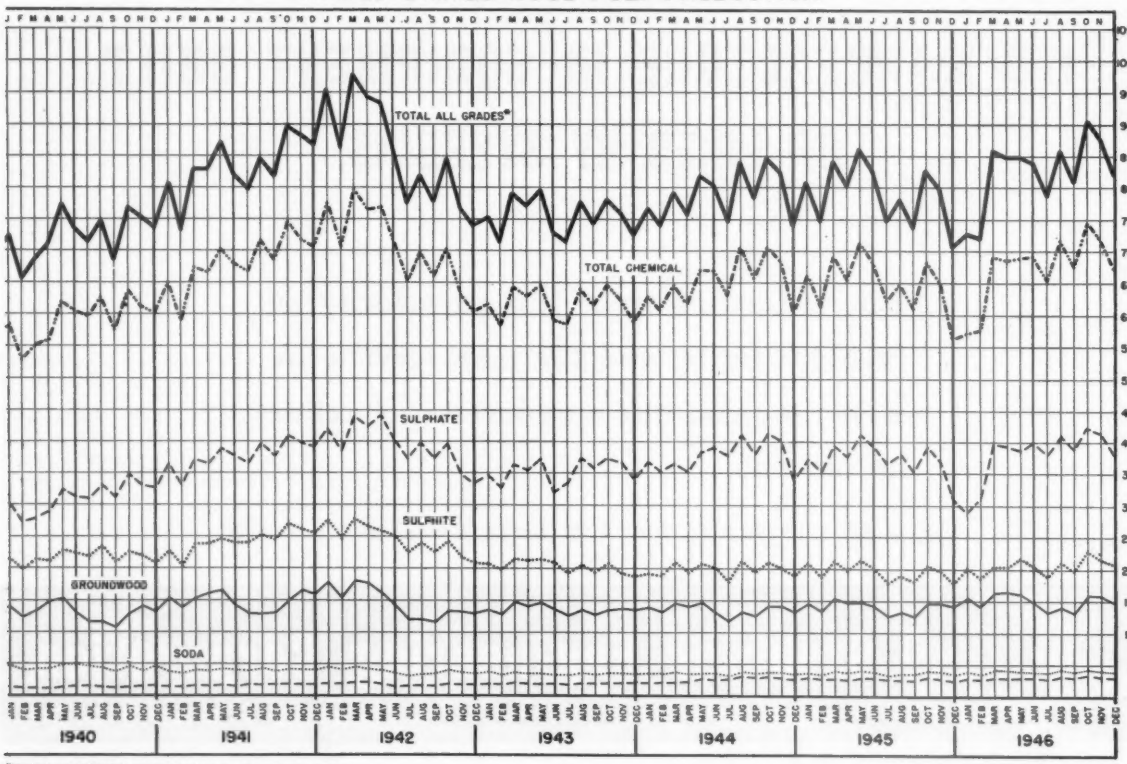
PACIFIC COAST MILL CAPACITIES

(In Tons Per Day)

(These are capacities reported to PULP & PAPER INDUSTRY by United States (Pacific Coast) and British Columbia mills as of May 1 of each year. The table also shows increases and decreases from previous years.)

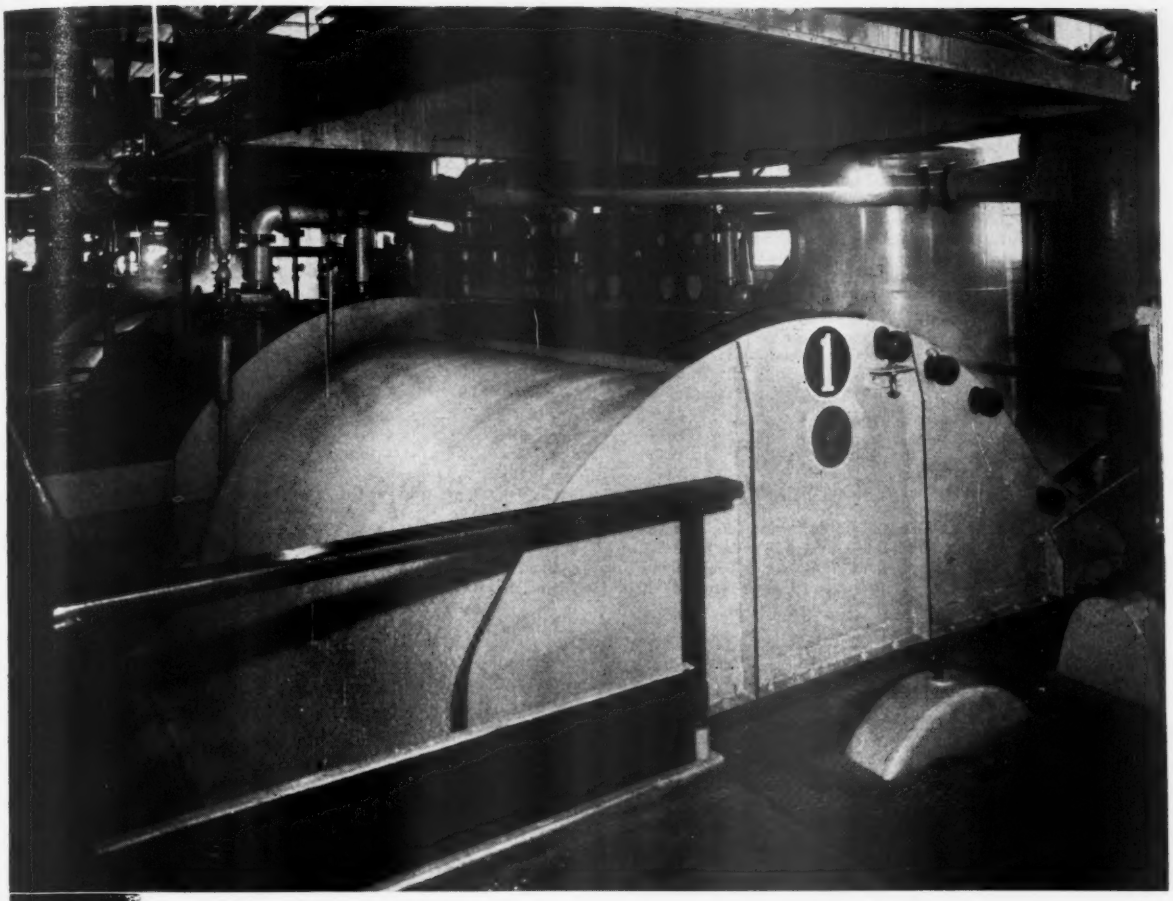
Pulp—	1941	1942	1943	1944	1945	1946
Unbl. Sulphite	1908	2163(+255)	2178(+ 15)	2228(+ 50)	1774(—454)	1774(.....)
Bl. Sulphite	2290	2240(+150)	2340(—100)	2360(+ 20)	2468(+108)	2478(+ 10)
Sulphate	1380	1560(+180)	1600(+ 40)	1600	1540(— 60)	1695(+155)
Groundwood	2235	2291(+ 56)	2251(— 40)	2275(+ 24)	2190(— 85)	2229(+ 90)
Soda	65	65	65	75(+ 10)	75	75 .....
Total Pulp	7878	8519(+641)	8434(— 85)	8538(+104)	8047(—491)	8251(+255)
Paper—						
Sulphite	963	1024(+ 61)	922(—102)	922	959(+ 37)	889(— 70)
Sulphate	830	850(+ 20)	865(+ 15)	865	865	885(+ 20)
Newsprint	1805	1756(— 49)	1753(— 3)	1753	1925(+172)	1855(— 70)
Paperboard	1468	1468	1483(+ 15)	1503(+ 20)	1582(+ 79)	1736(+154)
Book Paper	105	95(— 10)	95	105(+ 10)	53(— 52)	53 .....
Others	705	804(+ 99)	923(+ 94)	911(— 12)	1088(+177)	1046(— 42)
Total Paper	5876	5997(+121)	6041(+ 44)	6059(+ 18)	6472(+413)	6464(— 18)

UNITED STATES WOOD PULP PRODUCTION



*Exclusive of defibrated and exploded wood pulp and asphund fiber

Source: Estimated for 100% of industry by U.S. Pulp Producers Association



Pulp Washing in a Closed System

Are you losing valuable chemicals to the sewer?

Then investigate the Swenson-Nyman Pulp Washer which operates as a completely closed system and permits the escape of only the residual chemicals contained in the washed sheet—as low as 20 to 50 pounds per ton of pulp.

Are your steam costs too high?

Then you will be interested in how much less dilution there is with a Swenson-Nyman System—how it brings important reductions to evaporator loads.

Do you have trouble with foaming, backwashing, channeling?

Let us explain how Swenson-Nyman multi-stage countercurrent washing has been engineered to overcome these difficulties . . . how multiple units provide 3, 4, 5, and 6-stage operation . . . how it has brought increased efficiency in the manufacture of wood pulps. Write for Bulletin F-104.

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KRAFT PULP DECKERS • BLACK LIQUOR EVAPORATORS • LIME SLUDGE FILTERS • BLOW CONDENSERS

FLUCTUATIONS OF PULP PRICES IN U. S.

IN 1945 SWEDISH PRICES IN THE U. S. RESUMED AT APPROXIMATELY THE 1941 LEVELS SHOWN IN CHART BELOW AND THEN ANNOUNCEMENT CAME ON APRIL 11, 1946, OF INCREASES OF ABOUT 10%. FURTHER INCREASES WERE ALLOWED IN 1946. SINCE DECONTROL CAME IN DECEMBER, 1946, THERE HAS BEEN GREAT FLUCTUATION OF PRICES.

Some so-called "nominal" price quotations (per air dry ton at Atlantic ports) in April, 1947, are: Bleached sulfite, Swedish, $150 to $157.50; bleached sulfite, Finnish, $165.00; unbleached sulfite, Swedish, $120-$130; unbleached sulfite, Finnish, $132.50; kraft, unbleached, Swedish, $115-$125; kraft, unbleached, Finnish, $132.50; kraft bleached, Swedish, $155 Quotations on domestic pulp f.o.b. shipping points: Bleached sulfite, No. 1 bond quality, $120.00-$125.00; bleached sulfite, No. 1 book quality, $120.00-$125.00; bleached soda, No. 1, $120.00-$125.00; kraft, bleached, $130.00-$135.00; kraft, northern unbleached, $105.00-$112.50; kraft, southern, $90.00.

The Swedish price in 1945 and early 1946 in the U. S. was the domestic ceiling price east coast dock, with the seller required to absorb up to $7.00 inland freight. Therefore, in the case of bleached sulfite, their price was $86.00, and their average backhaul freight actually absorbed about $4.00, so that they ended up with an average east coast dock return of $82.00.

In the price raise announced April 11, 1946, bleached sulfite price went to $94. The Swedes also benefited by a $3 reduction from maximum in backhaul freight and their average backhaul cost was $3. Here follows the 1945-early 1946 prices and the 1946-1947 prices for the grades shown in the chart below, with the right hand column representing the figure comparable with those in the chart.

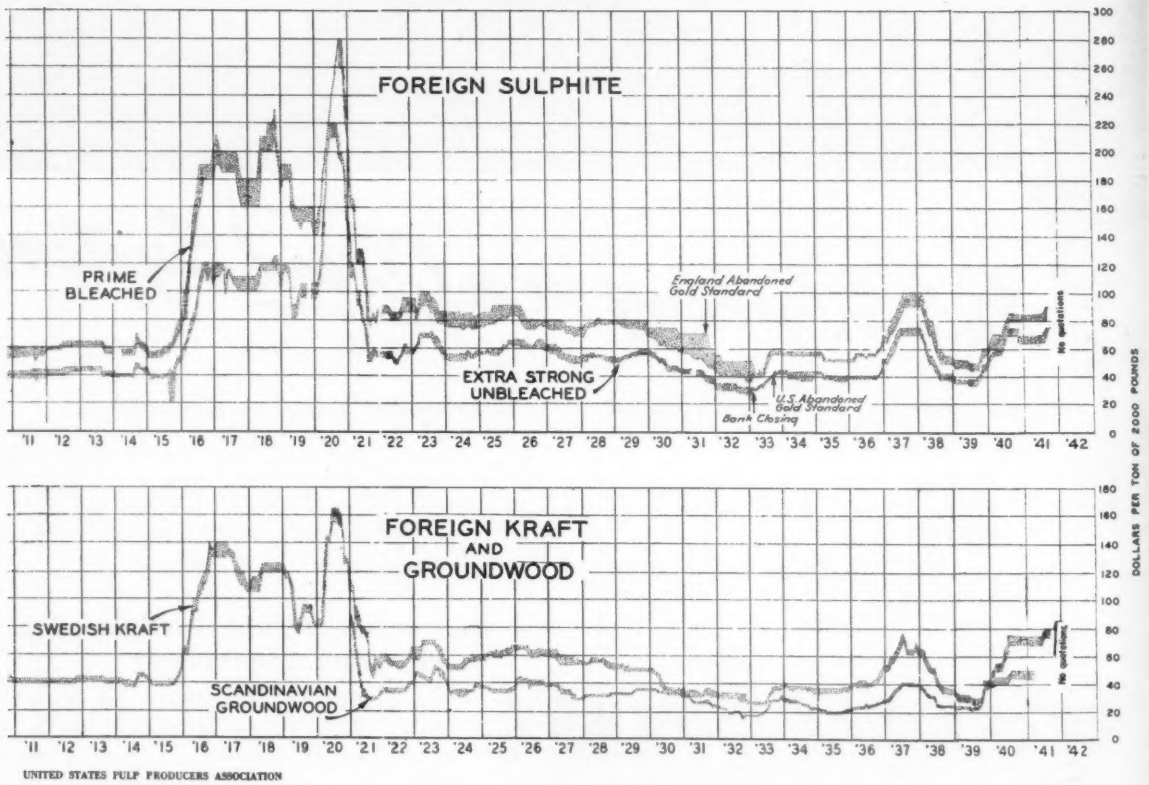
Grade	*Under Prices Early 1944-Early 1946* Delivered Price	East Coast Dock Equivalent	*Under Prices Announced 4/11/46* Delivered Price	East Coast Dock Equivalent	*Typical Quotations 4/11/47*		
Bleached Sulfite	$86.00	$82.00	$94.00	$91.00	$150.00	to	$165.00
Strong Unbleached	74.00	70.00	82.00	79.00	94.50	to	132.50
Swedish Unbleached Kraft	73.00	69.00	82.00	79.00	115.00	to	125.00
Groundwood (regular)	50.00	46.00	58.00	55.00	.....		.....

The average backhaul absorption is about $4.00. It may have been slightly higher on groundwood because they shipped in some wet tonnage.

The chart shows how bleached sulfite prices carried along at $80 in late '20s, took deep dips in the 1930's—as low as $35—which was a serious threat of existence of U. S. mills. First increase in OPA fixed prices in 3½ years of war period was in early 1944, when price went to $86. Then came the increases announced April 11, 1946, which boosted this price for bleached sulfite to $94. OPA released pulp from control in December, 1946. In April, 1947, bleached sulfite prices ranged from $120 to $165 (Finnish). On this chart there was no provision for such figures.

FOREIGN WOOD PULP PRICE TRENDS

SPOT QUOTATIONS, EX-DOCK, FIRST WEEK OF EACH MONTH



UNITED STATES PULP PRODUCERS ASSOCIATION

BRITISH COLUMBIA PULP AND PAPER AND ALL FOREST PRODUCTS ESTIMATED VALUE OF PRODUCTION

	1940	1941	1942	1943	1944	1945	10-Year Av.
Pulp and Paper	$22,971,000	$27,723,000	$27,457,000	$25,597,000	$30,391,000	$33,782,000	$22,734,200
All Forest Products	102,804,000	119,920,000	124,720,000	124,720,000	146,611,000	147,655,000	106,836,900



Pulp Washers in Bleach Plant—Southland Paper Mills, Inc., Lufkin, Texas

You can do All Paper Processing Jobs Better . . . with Reliance V★S Drive

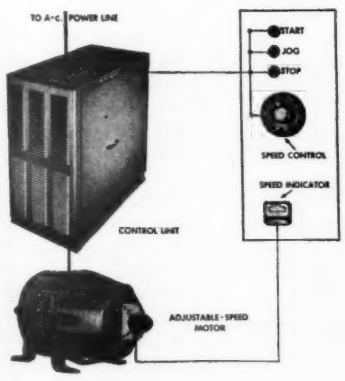
V★S, the *All-electric, Adjustable-speed Drive operating from A-c. Circuits,* provides unlimited flexibility of machine operation. Easy and instant control of speed assures the most efficient operating rate for any material. Starting, stopping and speed changing are smooth and can be controlled manually or automatically, from nearby or remote stations.

Conveniently-packaged, space-saving V★S Drives are available from 1 to 200 horsepower.

From the vast number and variety of V★S applications in the paper industry comes proof that this drive will help *you* increase production and reduce operating costs wherever a range of speeds is required. Write today for Bulletin 311 which gives further important facts about V★S Drive.

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RELIANCE A-C D-C MOTORS

"Motor-Drive is More Than Power"



A NEW APPRAISAL OF U. S. TIMBER RESOURCES GIVEN FOR FIRST TIME

IN this chapter, we are publishing for the first time in any periodical directed to the pulp and paper industry the new data developed by the U. S. Forest Service on its grandiose re-appraisal project for bringing up to date statistics on U. S. forest resources. Also published are data by the American Forestry Association on the Pacific Coast.

For this industry, the big news in the U. S. Forest Service Re-Appraisal of the timber resources and forest situation in the United States—which it completed in 1945 and 1946—is this:

"The outlook of the pulp and paper industry as a whole is encouraging. Pulpwood now constitutes 11% of the cut of all timber products. In all probabilities it will be somewhat more important in the future. The fact that the pulp mills can operate in part on trees smaller than saw-timber size gives them a considerable measure of security. Furthermore, the pulp and paper industry now uses many more species than it did in earlier years."

This assuring statement from the Forest Service, which never has been known to look upon the private industry's forestry practices with undue optimism, is cheering. But it is greatly concerned over the lumber industry's future, despite the fact that its survey shows tree growth virtually balancing drain in the U. S. forests in the year 1944. Later in this section, the Forest Service findings are summarized.

The U. S. Forest Service information has met with some criticism in the past on grounds that its surveys fail to take into account much small wood or even waste wood which the pulp industry is now using in considerable amounts but according to Col. W. B. Greely, director of the American Forest Products Industries, Inc., the latest U. S. Forest Service re-appraisal is pretty much in line with the recent appraisal made by the privately sponsored American Forestry Association.

He said that "for the first time in six or seven Forest Service national appraisals of timber in the past half century, there is real progress being shown because of the commercial urge to grow trees."

A point to remember in studying the tables shown in this section of the Review Number is that over 40% of industrial timber holdings reflect good management, a considerable portion being owned by large pulp and paper operations with long range forest policies. But 57% of the total—4,000,000 small wood lot owners—could actually double the U. S. timber crop if they also put into effect good forestry practices, according to Col. Greeley, who was himself a former U. S. chief forester.

Pulpwood Records in 1946

Before considering the long range picture, let us first take a look at current pulpwood statistics. A point that must give pause to anyone who is seriously concerned with a sound basis and future for the North American pulp and paper industry is that in 1946, and currently, all past records were and are being broken in the production

WASHINGTON FIRST, MAINE SECOND, LOUISIANA THIRD IN TOTAL CONSUMPTION OF PULPWOOD IN UNITED STATES

Washington State again was the only state consuming more than two million cords of wood in pulp mills in the United States in 1946—its total reaching the equivalent of 2,213,689 cords (wood measure in that state is usually by board feet, with 1,200 bd. ft. in one big log equivalent to about two cords). This was almost a half million cords more than the next two ranking states, Maine and Louisiana.

Following are figures from the U. S. Bureau of census, as calculated in cords for regions and states:

	1945	*1946*
UNITED STATES, TOTAL	16,911,861	17,817,560
New England States	2,158,075	2,300,973
Maine	1,704,386	1,859,174
New Hampshire	374,467	351,755
Vermont, Mass., R. I.	79,222	90,044
Mid-Atlantic States	1,324,923	1,407,795
New York	777,930	842,757
New Jersey	51,870	63,464
Pennsylvania	495,123	501,574
Middle West States	2,597,839	2,625,399
Ohio, Ill., Iowa	81,281	117,223
Michigan	373,814	401,035
Wisconsin	1,611,434	1,611,068
Minnesota	531,310	496,073
So. Atlantic States	4,677,858	4,833,691
Maryland, Virginia	963,667	1,037,282
No.-So. Carolina	1,681,227	1,751,605
Georgia	804,444	786,932
Florida	1,228,520	1,257,872
East So.-Central States	1,320,074	1,332,522
Tennessee and Alabama	770,493	780,458
Mississippi	549,581	552,064
West So.-Central States	2,361,562	2,536,788
Louisiana	1,634,655	1,755,224
Arkansas, Texas	726,907	781,564
Pacific States	2,471,530	2,780,392
Washington	2,088,092	2,213,689
Oregon	374,412	555,415
California	9,026	11,288

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and consumption of pulpwood—yet not anywhere near enough pulpwood is being produced to meet the demand for paper, paperboard, rayon and plastics.

Not a single old record of consequence, except one, in the pulpwood statistical information for the continent was left standing when the books were closed on 1946. More wood than ever before was consumed, more than ever before was produced and the only record still holding was that of U. S. imports from Canada as established in 1941.

In that year imports of pulpwood into the United States totaled 2,281,000 cords and it is very possible, what with the determination of Canada to develop its own manufacturing industries and to convert its own natural resources, that that figure will never again be attained.

On the Pacific Coast, a limited Canadian embargo on exports of pulpwood to Puget Sound mills of the U. S. has been in effect since 1942. Some American mills argued that they were located in that area on assumption that they could get part of their raw material from Canada, but manpower shortages and demand for pulpwood species for war lumber were immediate reasons for the embargo after exports had climbed from almost nowhere (about 10,000,000 bd. ft. in 1933) to 191,532,000 bd. ft. in 1941. There is no sign as yet of any relaxing of the limited embargo. Here are shipments in recent years (the embargo went into effect in late 1942).

British Columbia's Pulpwood Exports to Washington State Mills
In F.B.M.—About 500 F.B.M. to One Cord

Year	*Total*
1941	191,532,734
1942	106,793,550
1943	29,723,223
1944	32,027,805
1945	32,624,170
1946	about 32,000,000

Canadian exports to all U. S. mills are an uncertain 10% of U. S. supply—but a critical 10% and badly needed. The only assurance for it continuing is Canadian desire for exchange and assurance against a drop in employment—not good permanent reasons at all.

U. S. consumption of pulpwood hit a new high record of 17,803,000 cords, more than half a million cords above the record year of 1942.

The greatly enhanced importance of pulpwood to the national economy during and since the war period is clearly shown by a 64% increase in 1946 consumption over that of 1939.

U. S. PULPWOOD STATISTICS (1941-1946 INCLUSIVE)
Receipts, Imports, Consumption and Inventories
(In Thousands of Cords)

	(1) 1946	1945	1944	1943	1942	1941	Percent change 1946 vs: 1941
Receipts							
United States, total	18,938	16,983	16,998	15,293	17,140	16,458	+15.1
Domestic	16,950	15,254	15,349	13,581	14,908	14,177	+19.6
Imported	1,988	1,729	1,650	1,712	2,232	2,281	—12.8
Northeast, total	3,641	3,389	3,039	2,954	3,399	3,486	+ 4.4
Domestic	2,506	2,311	1,976	1,906	2,238	2,252	+11.3
Imported	1,135	1,078	1,063	1,047	1,161	1,235	— 8.1
Appalachian, total	1,711	1,388	1,482	1,303	1,475	1,412	+21.2
Domestic	1,679	1,365	1,472	1,302	1,448	1,378	+21.8
Imported	32	23	10	2	27	34	— 5.9
South, total	7,910	7,153	7,090	6,505	6,622	6,400	+23.6
Domestic	7,910	7,153	7,090	6,505	6,622	6,400	+23.6
Imported	—	—	—	—	—	—	—
Lakes States, total	2,901	2,456	2,637	1,969	2,796	2,241	+29.5
Domestic	2,222	1,954	2,175	1,409	1,983	1,561	+42.3
Imported	679	502	463	560	813	680	— 0.1
Pac. NW., total (2)	2,775	2,596	2,750	2,561	2,948	2,918	— 4.9
Domestic	2,633	2,470	2,636	2,458	2,616	2,585	+ 1.9
Imported	142	126	114	103	231	332	—57.2
Consumption, total	17,803	16,912	16,754	15,645	17,275	16,580	+ 7.4
Northeast	3,455	3,245	3,159	3,265	3,530	3,515	— 1.6
Appalachian	1,491	1,444	1,490	1,442	1,498	1,420	+ 5.0
South	7,517	7,208	7,153	6,342	6,804	6,227	+20.7
Lake States	2,560	2,544	2,474	2,325	2,471	2,398	+ 6.8
Pacific Northwest (2)	2,780	2,472	2,482	2,271	2,972	3,019	— 8.1
Inventories, total (3)	3,780	2,627	2,819	2,846	3,392	3,729	+ 1.4
Northeast	1,061	869	700	820	1,119	1,218	—12.9
Appalachian	423	206	279	280	423	439	— 3.6
South	526	145	218	293	126	334	+57.5
Lake States	1,351	986	1,088	962	1,313	995	+35.8
Pacific Northwest (2)	419	420	534	491	410	742	—43.5

Detail may not add to totals because of rounding.
(1) Estimated.
(2) Converted 600 board feet equal 1 cord.
(3) End of year.
Source: Bureau of the Census, except 1941-1944 inclusive, which is by Forest Products Bureau, War Production Board.

U. S. PULPWOOD CONSUMPTION BY REGIONS (1921-1940)
(In Thousands of Cords—and Percentage of Total)

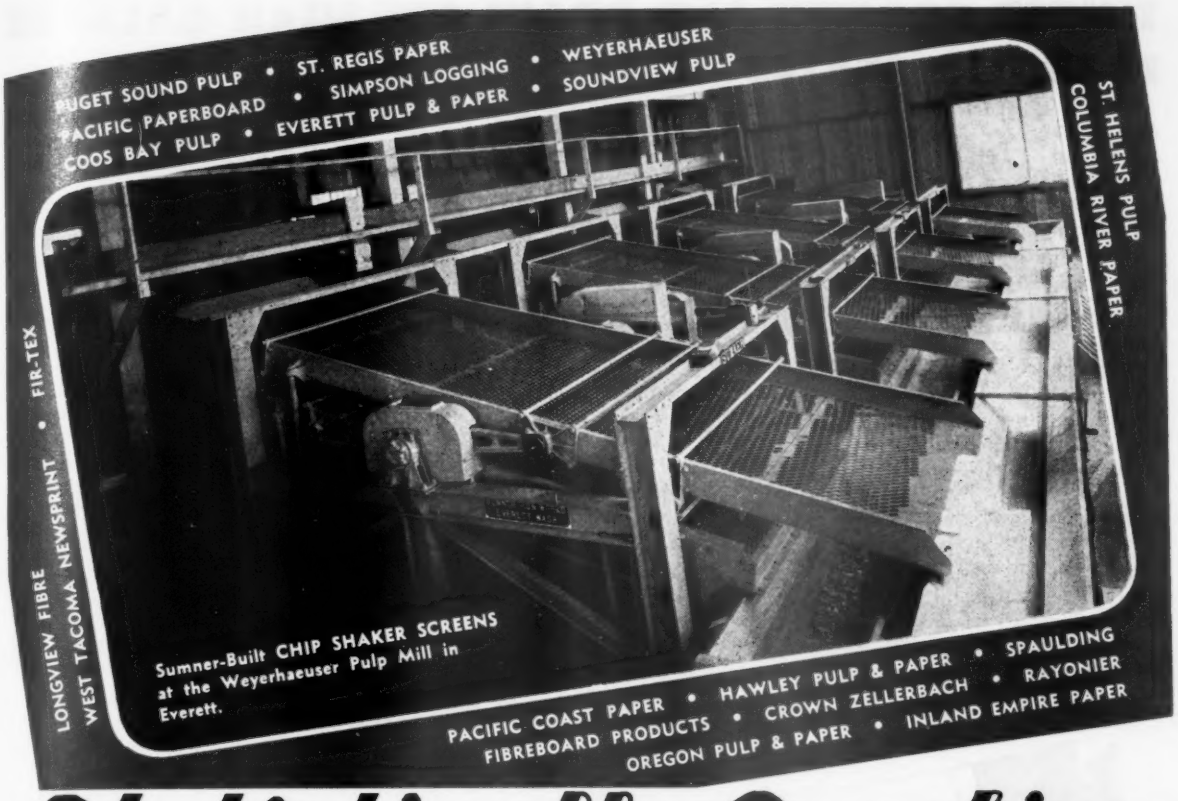
	New England		Middle Atlantic		Lake States		Pacific Coast		All Other States*	
	Th. cds.	Pct.	Th. cds.	Pct.	Th. cds.	Pct.	Th. cds.	Pct.	Th. cds.	Pct.
1921	1,345	29.5	1,107	24.3	1,218	26.7	342	7.5	542	12.0
1925	1,713	28.1	1,328	21.8	1,609	26.4	450	7.4	992	16.3
1930	1,513	21.1	1,116	15.5	1,679	23.3	1,351	18.8	1,535	21.3
1932	969	17.2	675	12.0	1,224	21.7	953	16.9	1,810	32.2
1935	1,096	14.4	788	10.3	1,454	19.1	1,693	22.2	2,596	34.0
1938	1,336	14.5	810	8.8	1,496	16.3	1,792	19.5	3,758	40.9
1939	1,660	15.3	891	8.2	1,658	15.4	2,335	21.6	4,270	39.5
1940	2,080	15.1	1,064	7.7	1,866	13.6	3,069	22.4	5,661	41.2

*Chiefly Southern.
Source: Bureau of the Census: 1941-1944.

Domestic and Foreign Pulpwood Consumed in the United States by Decades, 1860-1939

Decade	Total 1,000 cords	Domestic 1,000 cords	Imported 1,000 cords	Per Cent of Total Imported
1860-69	15	15	----	—
1870-79	215	215	----	—
1880-89	3,120	3,120	----	—
1890-99	12,845	11,000	1,845	14
1900-09	30,758	24,601	6,157	20
1910-19	47,981	39,248	8,733	18
1920-29	62,277	50,780	11,497	18
1930-39	79,678	70,598	9,080	11
Total	236,889	199,577	37,312	16

Souce: U S. Forest Service.



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TIMBER GROWTH AND DRAIN ARE NEAR BALANCE IN UNITED STATES

The U. S. Forest Service Re-Appraisal of the forest situation, carried out in 1945 and 1946 under direction of R. E. March, was the first it had made since 1938.

Tables published herewith show that its survey force found that for the year 1944, growth virtually balanced drain and probably considerably outstripped drain as far as pulpwood species were concerned over the entire United States.

The whole survey, however, does not deal to any extent with pulpwood; in fact, almost brushes that subject off with the conclusion that this industry has achieved "considerable security" and its future is "encouraging"—even if pulpwood cutting was increased by 33%.

Timber growth in all commercial forest lands of the U. S. in 1944 was placed at 13,400,000,000 cu. ft., while drain (cutting waste, fires, insects, disease, etc.) was figured at 13,700,000,000 cu. ft. (128 cu. ft. equals one cord). But the Forest Service pointed that growth was in poorer grades and species largely and that the drain on growing stock was heavy and critical. In saw-timber size trees, the drain was 50% greater than growth.

However, its growth versus drain figures, at first glance, certainly show a big improvement in comparison with previous surveys. In 1938, the Forest Service calculated growth at only 11,287,000,000 cu. ft. and drain at 13,463,000,000 cu. ft.

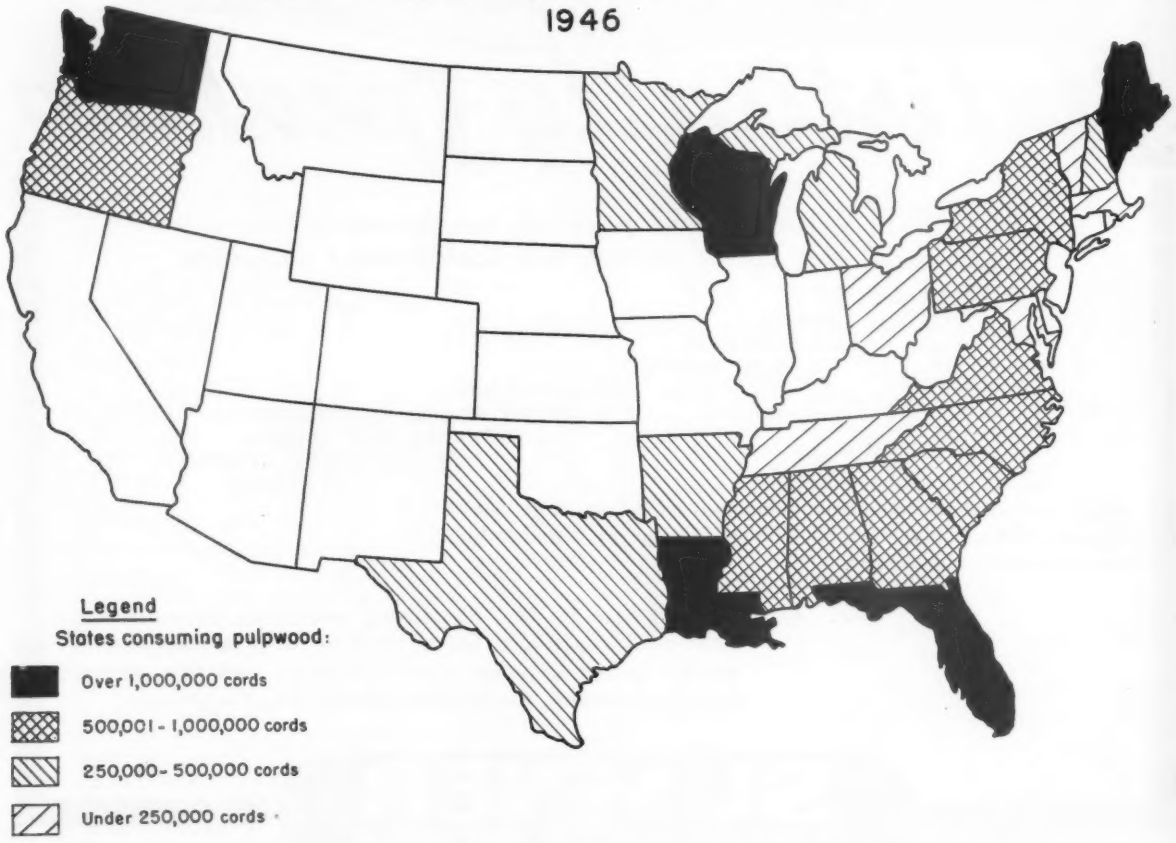
With drain at 13.7 billion cu. ft., in 1944, it estimated total cut at 12.2 billion cu. ft. (6.7 for lumber; 2.2 for fuel; 1.3 for pulpwood and the remainder for other purposes and these figures include "waste and breakage").

This latest Forest Service survey was different than others in the past in that it visualized an "economy of abundance" and proposed high goals for future timber cuts. It comes to the conclusion that the big threat which hangs over the lumber and veneer industries, in particular, is inadequacy and poor distribution of growing stock.

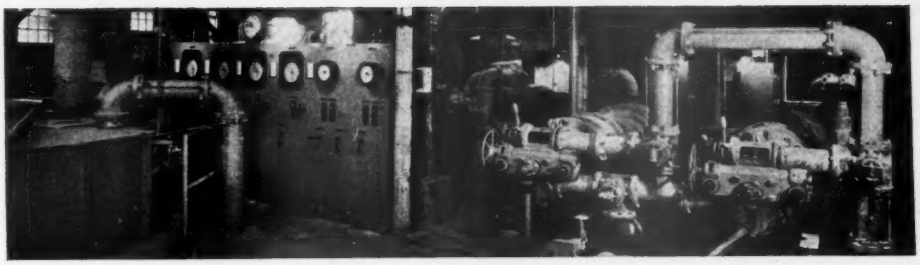
Perhaps it is worthwhile for pulpwood operators to look into what the Forest Service is driving for. It's mainly concerned with saw-timber and hopes to see a doubling of saw-timber size growth by the end of this century and it proposes a way to achieve this. It wants total growth of all timber boosted from 13,370,000,000 cu. ft. annually (as of 1944) to 20 billion cu. ft. and this would include 72 billion board feet of saw timber as an annual "crop."

To achieve this it calls for good forestry practice especially among small lot owners, considerable re-

PULPWOOD CONSUMPTION BY STATES
1946

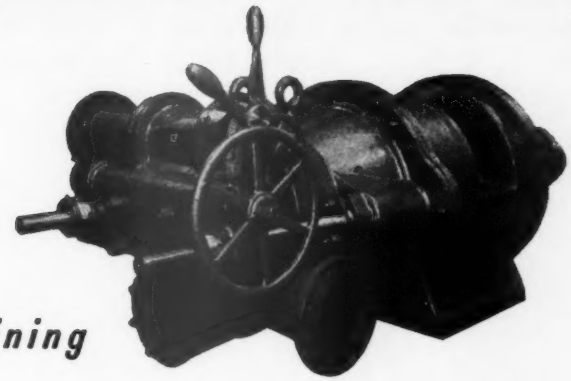


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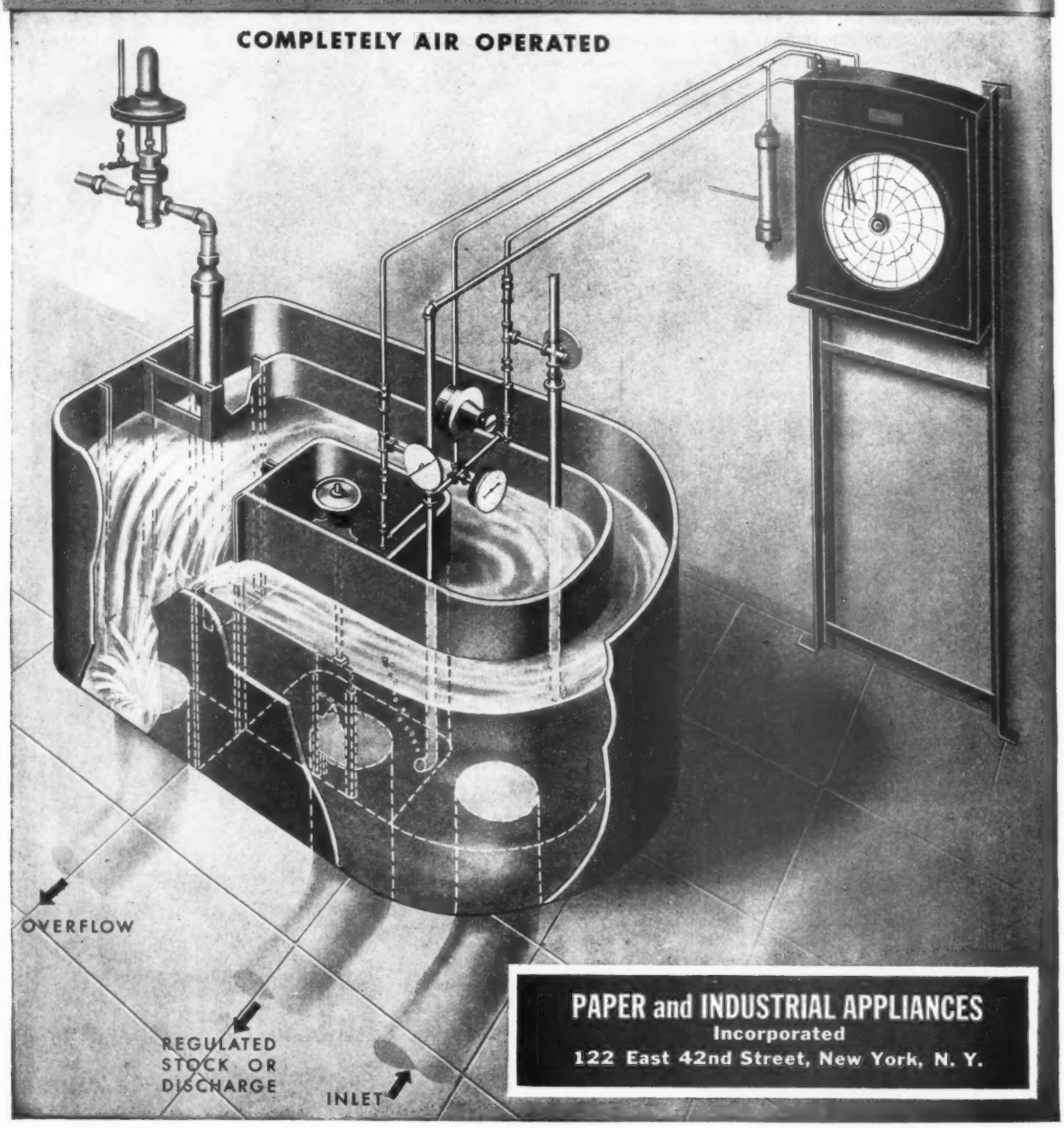
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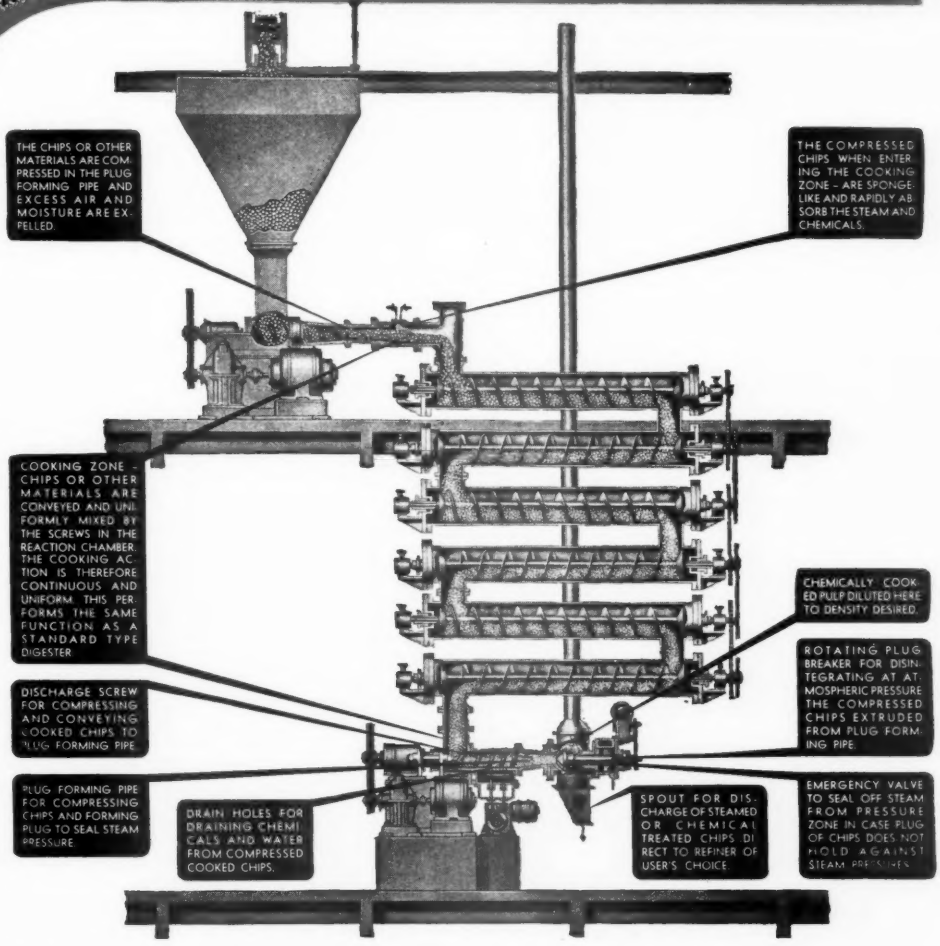
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stocking of timber, and a "temporary" reduction of saw-timber drain from 54 million board feet in 1944 to below 50 million for several decades. In about the year 2020 A.-D., the program would be achieved.

What readers of PULP & PAPER Industry want to know is how all this affects their industry.

Effects on Pulp and Paper

For one thing, the Forest Service visualizes a demand for 20 million cords of pulpwood annually in five to 10 years to make 24 million tons of paper (only 15 million cords were cut in 1944).

It held that 95% of pulpwood was a direct drain on growing stock, much of which should be allowed to grow to saw-timber size, and that more pulpwood should be obtained from thinnings, inferior trees, waste, etc.

It figures its goal can be achieved with intensive good management achieved on 100 million acres; less intensive on 300 million and 60 million less accessible areas meeting only minimum requirements. (There are 624 million acres—one third of all U. S.—"useful" as forest land, but 163 million is non-commercial and only 461 million "can be counted on for growing commercial timber," of which 139 million are owned by farmers.) It may not be possible to get effective management from millions of acres held by small and needy owners in low standard areas, the Forest Service held, and these are the landowners counted on largely for pulpwood supply.

A total of 261 million acres—57% of all that can be "counted on"—is in the hands of 4,200,000 owners, 97% east of the Great Plains. These owners have less than 5,000 acres each. Two-thirds of large owners (each with 50,000 acres or more) are in hands of pulp and lumber companies, and this accounts for only 51,000,000 acres or 11% of commercial forest land. The Forest Service said 29% of large owners practice high order of cutting (building up or maintaining yield) or good cutting practices (the latter being good silviculture and leaving land in good condition). Another 39% are beginning practices that will maintain good stock, it said. On the other hand, 71% of small owners were adjudged as carrying on poor and destructive practices and only 4% of a high order. And 61% of middle class of owner (5,000 to 50,000 acres) were also cutting destructively.

What the Forest Service did not point out—at least we found no mention of it in the voluminous material we fine-combed—is that if there is a continuing drain of saw-timber, the lumber and veneer plants become more competitive with the pulpwood users. In fact, this trend already has been marked for several years and has driven the price of pulpwood to high levels.

In discussing the pulp and paper industry's use of timber resources—11% of the cut for all timber products—the Forest Service makes some suggestions in its report which were initiated by private industry long before the report was written. In fact, these suggestions regarding uses of hardwoods and Douglas fir have been made possible only by the research carried on over recent years by private industry which was well aware of the necessity of broadening its supply source. These new sources are capable of balancing wood supply of several mills so that they can now look forward confidently to permanent future operation. But here is the Forest Service summary:

"The fact that the pulp mills can operate in part on trees smaller than saw-timber size gives them a considerable measure of security. Furthermore, the pulp and paper industry now uses many more species than it did in earlier years.

"Manufacturing plants in the older producing regions (New England, Middle Atlantic, and Lake) do, however, face a major timber supply problem arising from overconcentration. The supply of suitable raw material is inadequate to meet demands in each of those regions. The mills import pulpwood not only from Canada but also from other States. In these regions hope for continued operation of many of the older groundwood mills which have been using spruce and fir lies in converting to the manufacture of other

GROWTH AND DRAIN ON COMMERCIAL FORESTS IN U. S. DURING 1944

(Calculated by U. S. Forest Service for all Timber 5 inches diameter waste high, or over)

	In Millions of Growth	*Cu. Ft. Drain*
New England	897	761
Middle Atlantic	1,397	846
Lake	812	747
Central	1,440	1,201
Plains	120	118
North	4,666	3,675
South Atlantic	1,761	1,596
Southeast	2,714	3,023
West Gulf	1,916	1,842
South	6,391	6,461
Pacific Northwest:		
D. fir sub-region	1,024	2,150
Pine sub-region	219	468
Total	1,243	2,618
California	335	489
North Rocky Mt.	540	316
South Rock Mt.	195	104
West	2,313	3,527
All Regions	13,370	13,661

VOLUME OF TIMBER ON COMMERCIAL FOREST LANDS OF UNITED STATES
As of 1945, According to Re-Appraisal by U. S. Forest Service
(In Millions of Cubic Feet—128 cu. ft. to one cord)

*Region**	*All trees over 5 in. D.B.H.* Total	Soft-wood	Hard-wood	*Trees too small for sawtimber, large enough for pulpwood—over 5 in. D.B.H.*** Total	Soft-wood	Hard-wood
New England	24,626	11,318	13,308	11,312	4,667	6,645
Middle Atlantic	27,359	5,376	21,983	12,128	2,545	9,583
Lake	23,200	7,000	16,200	9,500	2,800	6,700
Central	20,992	1,479	19,513	10,036	933	9,103
Plains	3,723	269	3,454	2,656	179	2,477
North	99,900	25,442	74,458	45,632	11,124	34,508
South Atlantic	35,965	17,031	18,934	13,776	4,595	9,181
Southeast	54,220	23,841	30,379	23,199	8,013	15,186
West Gulf	40,689	17,460	23,229	17,065	5,953	11,112
South	130,874	58,332	72,542	54,040	18,561	35,479
Pacific Northwest						
Douglas fir sub-region	117,222	115,499	1,723	26,619	25,573	1,046
Pine sub-region	28,657	28,623	34	6,681	6,663	18
TOTAL	145,879	144,122	1,757	33,300	32,236	1,064
California	44,600	44,600	.....	3,350	3,350	.....
North Rocky Mountain	33,350	32,926	424	12,295	12,070	225
South Rocky Mountain	15,442	14,575	867	4,944	4,263	681
West	239,271	236,223	3,048	53,889	51,919	1,970
All regions	470,045	319,997	150,048	153,561	81,604	71,957

Volume does not include bark. Includes volume on land capable of producing timber of commercial quantity and quality and available now or prospectively for commercial use.
*See other table on page 106 for states included in regions.
**But may be saved for sawtimber. Up to 9-13 in. D.B.H. in East and South and up to 15 in. D.B.H. generally in West.

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types of pulp from beech, birch, maple and aspen.

"In the South, the pulp and paper industry is relatively new and still growing. There the danger is that the expansion will result in over-concentration of plants along the coast. Competition with the lumber industry for timber is an important problem but solution may be found in opportunities for integration of wood requirements in plans for sustained yield forest management.

"In the Pacific Northwest the supply of pulp timber of the species now used by the industry is inadequate to meet future needs. The sulfite mills which predominate in this region are pressing upon the supply of the favored species, western hemlock and Sitka spruce. Increasing amounts of hemlock are being used for lumber and the pulp industry faces competition with the sawmills for the higher-grade logs. On the other hand there are large quantities of the true firs and Engelmann spruce which should become economically available as logging moves farther up in the mountains. The western industry could also expand by using Douglas fir and lodgepole pine for sulfate pulp.

"Modern pulp mills must be large. For low-cost operation sulfite mills need a capacity of at least 100 tons per day and sulfate mills 200 tons. Because of large plant investment, raw material supply is important. Realization of the necessity for firm control of an adequate raw material supply and sharp competition from other forest products industries have stimulated the pulp and paper industry in recent years to an aggressive policy of land acquisition and forestry management, particularly in the South and Pacific Northwest. In New England and New York some units of industry have long had an established policy of forest land ownership."

In another section of its report, the Forest Service says: "Under conditions of reasonable prosperity and adequate timber supply which we have assumed, the pulp and paper industry may be expected to continue its long-time upward trend, although perhaps at a reduced rate of increase."

In discussing its drain and growth data, the Forest Service said it has little significance in the Far West because of 80% of its saw-timber which is virgin growth. Only one-fourth of all virgin timber in the U. S. is high quality—the rest being defective or long past prime and in advanced stages of decadence. Although there is still more growing stock on the Pacific Coast than it considers necessary, the Forest Service claims drain was 3 billion board feet greater in 1944 than can be permanently sustained and contends that there is now premature cutting of second growth.

"We must not be deceived by the apparently favorable relation between all timber growth and drain in the North and South," said the report. "Largely as a result of the advanced stage of timber depletion, which has forced many older wood-using plants out of business and made it difficult for new ones to start, growth of all timber exceeds the present drain in the North by 27%. That this balance by itself is not satisfactory is apparent when we consider that there is a deficit of saw-timber growth and consider also the inferior quality and small size of the timber which now constitutes a large part of the forest in this section of the country.

In the following table is shown the Service's "growth goal" for an "abundant economy":

U. S. COMMERCIAL TIMBER
In Millions of Cu. Ft. in 1945
(By U. S. Forest Service)

	All Trees 5 in. D.B.H. or over	*Pulpwood size**
New England:		
Connecticut	967	519
Maine	15,046	6,809
Massachusetts	2,194	1,089
New Hampshire	3,378	1,563
Rhode Island	120	78
Vermont	2,921	1,254
Mid-Atlantic:		
Delaware	441	171
Maryland	1,859	926
New Jersey	1,210	684
New York	9,668	3,807
Pennsylvania	9,570	4,224
West Virginia	4,611	2,316
Lake:		
Michigan	10,300	3,800
Minnesota	5,900	2,800
Wisconsin	7,000	2,900
Central:		
Illinois	1,412	451
Indiana	1,919	397
Iowa	1,904	520
Kentucky	6,826	3,822
Missouri	6,041	4,243
Ohio	2,890	603
Plains:		
Kansas	1,391	911
Nebraska	1,078	828
North Dakota	465	355
Oklahoma (West)	.....	.....
South Dakota (East)	630	450
Texas (West)	159	112
South Atlantic:		
North Carolina	14,729	5,312
South Carolina	9,685	3,156
Virginia	11,551	5,308
Southeast:		
Alabama	13,620	6,208
Florida	7,239	3,345
Georgia	15,237	6,322
Mississippi	12,131	4,992
Tennessee	5,993	2,332
West Gulf:		
Arkansas	15,187	6,845
Louisiana	13,933	5,263
Oklahoma (East)	1,303	648
Texas (East)	10,266	4,309
Pacific Coast:		
Oregon	85,213	16,917
Washington	60,666	16,383
California	44,600	3,350
North Rocky Mountain:		
Idaho	14,024	4,055
Montana	14,137	5,896
South Dakota (West)	868	294
Wyoming	4,321	2,050
South Rocky Mountain:		
Arizona	2,924	468
Colorado	9,617	3,744
Nevada	100	36
New Mexico	1,705	421
Utah	1,096	275
All States	470,045	153,561

*Over 5 in. DBH, up to 9 to 13 in. in East, depending on species; and South, generally up to 15 in. in West. Must occupy 10% growing space. May be saved for sawtimber.

U. S. TIMBER STAND IN 1945
and percentage of desired growing stock to meet Forest Service objectives which it represents.

	Billion cu. ft.	*Percent Growing Stock*
New England	25	78%
Middle Atlantic	27	57%
Lake	23	66%
Central	21	40%
Plains	4	100%
NORTH	100	59%
South Atlantic	36	106%
Southeast	54	63%
West Gulf	41	69%
SOUTH	131	73%
Pacific Northwest:		
D. fir subregion	117	107%
Pine subregion	29	97%
TOTAL	146	105%
California	45	100%
North Rocky Mt.	33	79%
South Rocky Mt.	15	79%
WEST	239	98%
UNITED STATES	470	79%

FOREST SERVICE GOAL
All Timber

	Billion cu. ft. Growth goal	*1944 growth*
New England	1.14	0.90
Middle Atlantic	1.64	1.40
Lake	1.15	.81
Central	1.73	1.44
Plains	.12	.12
North	5.78	4.67
South Atlantic	2.14	1.76
Southeast	4.80	2.71
West Gulf	3.20	1.92
South	10.14	6.39
Pacific Northwest:		
D. fir subregion	2.17	1.02
Pine subregion	.38	.22
Total	2.55	1.24
California	.64	.33
North Rocky Mt.	.65	.54
South Rocky Mt.	.24	.20
West	4.08	2.31
United States	20.00	13.37

In its view, the timber industries could not go on another two decades at the 1944 rate of output, without



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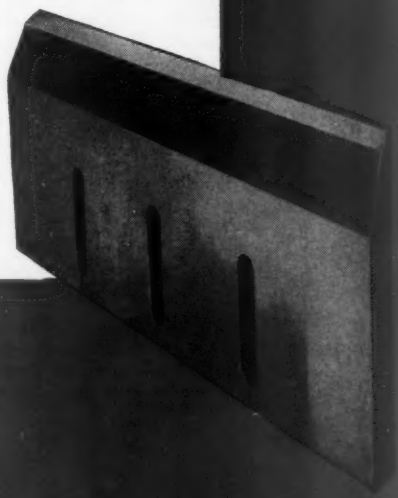
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some changes in practice. The report goes into detail in deploring the poor qualities of timber which have been allowed to replace high quality species. One example—what it calls "scrubby aspen which grows slowly and deteriorates at an early age" in place of pine in the Lake states. And in eight Southern states hardwood volume has increased 5% while softwoods decreased 4% in a decade. A huge planting job is ahead, it says—possibly on 30 to 35 million acres of 75 million said to be denuded. Regarding waste, the Service said:

"Only about half of the 12.2 billion cu. ft. of timber cut in 1944 appeared in the primary products for which the trees were cut. The other half was left in the woods as waste in logging or went into mill waste as slabs, edgings, trimmings, sawdust, shavings, and other fine material. One-third of this 6 billion cu. ft. of waste was used for fuel but the balance was not used at all. In addition about 9 million tons of lignin, cellulose, and other chemical residue from the manufacture of wood pulp was wasted. Along with the 9% of the standing timber which is in cull trees, this waste wood represents an important potential source of raw material. If a greater proportion of the trees cut and more cull trees can be put to commercial use, there will be a corresponding reduction in the amount of timber growth needed to meet total requirements for forest products.

"The greatest opportunities for better utilization lie in the Pacific Northwest because there the heavy volumes-per-acre and big mills result in large concentrations of waste. It is estimated that in the Douglas-fir region the average logged-over acre contains 11,500 board feet of damaged trees and abandoned logs suitable for small mill operation. Already some operators are using portable mills, chippers, and light tractors to go in for the stranded logs and damaged trees after the main stand has been removed, or to take out in advance the trees likely to be damaged in the main logging job."

In the Far West and in the South Atlantic states the actual timber stand as of 1945 was somewhat greater than the amount of growing stock which the Forest Service visualizes as necessary.

Conclusions

The Forest Service figures that annual growth of 64 billion feet of saw timber could be attained by 1990 A. D. and by that time the program would be adding 10 billion bd. ft. annually to saw-timber. Drain could then rise to 64 million ft. and growth could level off. But this would not allow for what it calls "security, export, new uses and ineffective growth." So it urges achieving the 72 billion ft. goal in saw-timber by building up stock and growth another 25 or 30 years.

"It is important to emphasize," the report concluded, "that there is nothing rigid about the growth objectives we have proposed, or the possible course of growth and drain under a forestry program designed to achieve the goal with minimum disruption of forest industries and markets. The growth goals simply represent one view of what a large and vigorous nation should strive for. They are based on study of potential requirements under the assumptions of reasonably full employment and timber available at reasonable price. If we should not have full employment we probably would not feel the need for as much timber as the goals suggest. On the other hand, if we did mave full employment, but *did not* have enough timber (which would seem to be the inescapable reality with full employment), we would doubtless use more brick and stone and metals instead of wood.

"Similarly, the hypothetical cutting program with the resultant increase in annual growth, while based on careful analysis of the possibilities in each region, is only one course that might be followed. Cutting more heavily than indicated for any extended period would delay or preclude the increase in annual growth envisaged for the North and South. It might lead to a protracted period of greatly reduced cut in the West, should the virgin timber be exhausted before new growth was ready to support the indicated sustained volume of output. On the other hand, several years of greatly reduced output in a depression like that of the thirties might result in building up growing stocks, and hence annual growth, more rapidly than indicated."

Far Western Wood Statistics

Periodic pulpwood surveys in Washington, Oregon, Northern Idaho and Western Montana have been special features of PULP & PAPER Industry's Review Number each year. We are pleased to be able to present this information again in this issue—brought up-to-date by the regional Forest & Range Experimental Station officials. These tables are revised to Jan. 1, 1946.

The Forest Service reported on April 1st of this year that it had not collected, as yet, records of depletion during the year 1946 upon which to base a revision of the remaining volume of the various pulp species in that region.

A record of the volume of sawlogs produced during 1946 is now in process of being collected by canvass of the many logging operators in Oregon and Washington, but complete results of this canvass will probably not be available until July or August.

However, it should be noted that tables on pages 110-112 do not include Douglas fir, of which there is about 65 billion bd. ft. in the region (second growth). The Forest Service has left this species out in the preparation of the table for this magazine, because Douglas fir has been—and still is—the dominant lumber species.

But it is rapidly becoming a species of value to the pulp and paper industry. A tremendous use of fast-growing second growth Douglas fir is taking place in the pulp mills, thanks to the new groundwood and kraft and bleaching processes. In some mills it will be the dominant pulpwood species.

This species already comprises 50% of raw material for the western kraft pulp and insulating board mills. Most of this is in shape of slabs from sawmills. Both large log and slab hydraulic barkers, being installed extensively in the West, are increasing the use of this species of wood.

However, information is now available for Douglas fir resources as the first authoritative inventory in 14 years has been made by the American Forestry Association, financed by pulp, paper and lumber industries (See table on Page 114).

Of the available merchantable timber about one third is second growth Douglas fir, now being used to a large extent by pulp mills with new kraft processes and bleaching techniques.

Total merchantable timber in the Douglas fir region is 439,070,594 board feet (equal to about 850 million cords). This includes also hemlock and spruce, traditional pulpwoods. If no more timber were to grow, that's enough for 60 years, according to the AFA inventory.

Results of this inventory indicate an annual minimum sustained yield would total 13.1 billion board feet, if good utilization were practiced. If all forest acres could be brought

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to good growing capacity, Burt F. Kirkland, in charge of the survey, estimated a 20 billion board feet sustained yield annually (equal to about 40 million cords).

Of total merchantable timber, 230,992,301,000 feet is federally owned; 22,844,653,000 feet state owned; 7,897,611,000 feet county and municipally owned, and 177,336,029,000 feet privately owned. Of publicly owned commercial timber, 26,069,511,000 feet is reserved from cutting. This is nearly six per cent of the total timber in the Douglas fir region. (*See table on Page 114*).

This is in contrast to the past practices common in the region of basing the cut on a formula, which depended on the amount of standing timber, growth rate, etc. The U. S. Forest Service, under which the holdings of the federal government comprise more than half the timber supply of the region, still uses these methods. "Hence these government lands are calculated to produce about 2.2 billion feet annually. Since it owns more than half the timber of the region," Kirkland states, "application of these methods to the entire regional resources immediately would reduce the annual cut to slightly in excess of one-third the cut of 1944, which was normal for a prosperous year. Almost 2/3 of the forest industry of the reigon would have to cease operation at once.

"If none of the billions of board feet lost annually through mortality in old and young stands is to be salvaged and included in cutting budgets these methods might be applicable. It should be remembered, however, that under them the mortality losses, estimated at one-third M bd. ft. per acre per year in old growth stands, would continue to occur until the removal of all old growth is completed near the end of the first rotation under management. Precise figures cannot be given but old growth mortality losses alone might well, in the 80 to 120 years allotted for cutting these stands, amount to 100 to 150 billion board feet."

Forest Service Statistics

Accompanying tables show the volume in thousands of cubic feet of pulp woods—available for cutting and other than Douglas fir—in Western Washington and Western Oregon have been revised as of January 1, 1946.

These figures are from data prepared by the Pacific Northwest Forest and Range Experiment Station, U. S. Forest Service, Portland, Ore.,

Volume In Thousand Cubic Feet[1] of Pulpwood Other Than Douglas Fir In Western Washington and Western Oregon, Available for Cutting,[2] by Species Groups[3]

Adjusted to January 1, 1946

Species—	Western Oregon	Western Washington	Total
Western hemlock	5,304,000	14,967,000	20,271,000
Sitka spruce	730,000	1,074,000	1,804,000
Balsam firs[4]	3,456,000	6,085,000	9,541,000
Mountain hemlock and Engelman spruce	804,000	313,000	1,117,000
Black cottonwood	72,000	128,000	200,000
Totals	10,366,000	22,567,000	32,933,000

Adjusted to January 1, 1945

Species—	Western Oregon	Western Washington	Total
Western hemlock	5,405,000	15,172,000	20,577,000
Sitka spruce	773,000	1,107,000	1,880,000
Balsam firs[4]	3,501,000	6,099,000	9,600,000
Mountain hemlock & Engelmann spruce	804,000	313,000	1,117,000
Black cottonwood	72,000	128,000	200,000
Total	10,555,000	22,819,000	33,374,000

Adjusted to January 1, 1944

Species—	Western Oregon	Western Washington	Total
Western hemlock	5,413,000	15,525,000	20,938,000
Sitka spruce	748,000	1,153,000	1,901,000
Balsam firs[4]	3,425,000	6,011,000	9,436,000
Mt. hemlock, Engelmann spruce	804,000	313,000	1,117,000
Black cottonwood	72,000	128,000	200,000
Total	10,462,000	23,130,000	33,592,000

[1]Includes all trees 4 inches and more, diameter breast high.
[2]Excludes timber reserved from cutting in municipal, state and federal ownership.
[3]Compiled by Pacile Northwest Forest and Range Experiment Station from Forest Survey data adjusted for cutting depletion and growth.
[4]Includes Pacific silver fir, grand fir, noble fir, Shasta red fir, white fir, and alpine fir.

1936 — For All Ownerships

Species—	Western Oregon	Western Washington	Total
Western Hemlock	6,439,886	18,654,070	25,093,956
Sitka Spruce	1,145,377	1,625,924	2,771,301
Engelmann Spruce	46,643	9,259	55,902
White Fir	1,652,378	314,023	1,966,401
Amabilis Fir	763,712	6,567,606	7,331,318
Noble Fir	1,338,837	614,175	1,953,012
Alpine Fir	24,675	37,234	61,909
Mountain Hemlock	931,527	372,386	1,303,913
Total	12,343,035	28,194,677	40,537,712

Note—Other tables on this page for later years exclude government-owned reserves.

INLAND EMPIRE PULPWOOD* BY SPECIES AND SUBREGION

Data as of Jan. 1, 1945

Subregion†	*Engelmann Spruce*	*Hemlock*	*Balsam firs*	*Cottonwood and aspen*	*Total*
	Million Cubic Feet				
Northeastern Washington	32	41	53	4	130
North Idaho	608	386	1,697	10	2,701
Western Montana	828	54	242	53	1,177
Total	1,468	481	1,992	67	4,008

*The sound volume inside bark of trees larger than 5.0 inches d.b.h. from stump to 4- to 6-inch top diameter.

†Northeastern Washington consists of Ferry, Pend Oreille, Spokane and Stevens Counties; North Idaho is the portion north of the Salmon River; western Montana is the portion west of the Continental Divide.

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based on forest surveys started in 1930, and completed in 1933 and 1934. The results were first published in the Review Number of this journal in 1937, and revised in each Review Number since then. References may be made to the 1938 issue for greater detail as to the forest study.

Timber on municipal watersheds state parks, national parks, and primitive areas in national forests, which because of laws or declared public policy is not available for commercial use, was not included.

Since completing the survey the experiment station staff has brought the inventory of the forests of the majority of the counties in the region up to date through field examination.

To date the reinventory has been completed for the following 30 counties: Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, King, Kitsap, Lewis, Mason, Pacific, Pierce, Skagit, Snohomish, Thurston, Wahkiakum, and Whatcom Counties, Washington, and Benton, Clackamas, Clatsop, Columbia, Coos, Lane, Lincoln, Linn, Marion, Multnomah, Polk, Tillamook, Washington and Yamhill Counties, Oregon. It is planned to complete the reinventory of Douglas and Jackson Counties, Oregon, this year.

Volumes have been made current to Jan. 1, 1946, by adjusting the reinventories of the above-named counties and the original inventories for the other counties for depletion through cutting and increment through growth.

The cubic foot volume estimates give the total sound wood content of the stem of the tree, exclusive of bark and limb wood. Decayed material is omitted, as well as the entire volume of all cull logs having more than two-thirds of the board foot content defective. No deduction was made for breakage in logging.

The ratio of timber in the various ownership classes remains about the same as in previous years.

Approximately 45% is privately owned; 43% on national forest lands, such as county, state, Indian reservations, etc.

Not all of the timber shown in the tables will be available for pulp; considerable volumes of both western hemlock and Sitka spruce are utilized annually for lumber. In 1944 more than 600 million board feet of western hemlock logs and 300 million board feet of Sitka spruce logs, cut in the Douglas-fir region, were manufactured into lumber. However, it has been esti-

Volume of Pulpwoods, Other Than Douglas Fir, in Western Washington and Western Oregon Available for Cutting, by County (In thousands of cubic feet)

WASHINGTON

County—	1936	1944	1945	1946
Clallam	3,732,187	2,741,000	2,672,000	2,641,000
Clark	34,248	33,000	32,000	32,000
Cowlitz	972,384	881,000	870,000	860,000
Grays Harbor	2,902,400	2,567,000	2,481,000	2,452,000
Island	8,934	9,000	9,000	9,000
Jefferson	3,456,382	2,237,000	2,215,000	2,204,000
King	2,166,924	2,051,000	2,131,000	2,109,000
Kitsap	23,295	19,000	19,000	18,000
Lewis	2,423,835	2,067,000	2,028,000	1,997,000
Mason	465,119	334,000	331,000	329,000
Pacific	1,908,220	1,832,000	1,753,000	1,727,000
Pierce	1,358,908	1,187,000	1,148,000	1,127,000
San Juan	11,461	11,000	11,000	11,000
Skagit	1,836,559	1,699,000	1,664,000	1,641,000
Skamania	1,825,243	1,831,000	1,845,000	1,837,000
Snohomish	2,266,424	2,176,000	2,159,000	2,148,000
Thurston	53,818	31,000	31,000	31,000
Wahkiakum	508,615	438,000	463,000	454,000
Whatcom	1,006,741	986,000	957,000	940,000
Total	26,961,697	23,130,000	22,819,000	22,567,000

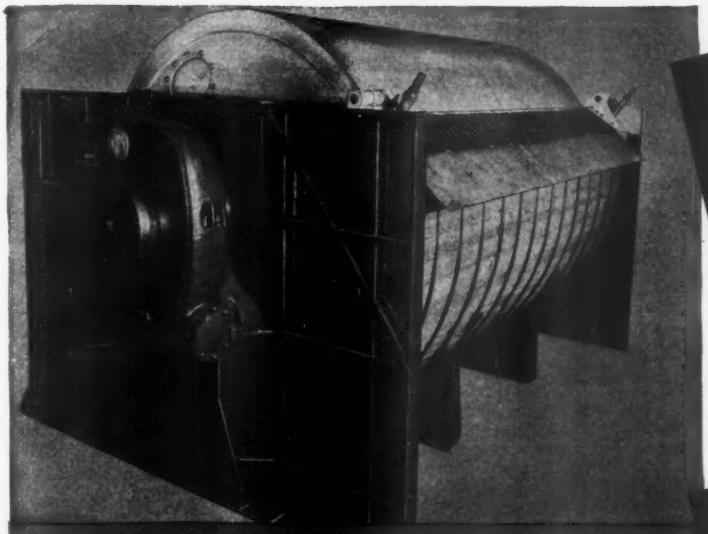
OREGON

County—	1936	1944	1945	1946
Benton	58,273	34,000	33,000	32,000
Clackamas	1,141,042	1,087,000	1,241,000	1,215,000
Clatsop	1,089,450	1,163,000	1,131,000	1,110,000
Columbia	48,139	36,000	37,000	36,000
Coos	434,653	310,000	389,000	387,000
Curry	185,953	187,000	192,000	192,000
Douglas	1,635,494	1,548,000	1,570,000	1,552,000
Hood River	424,900	292,000	340,000	340,000
Jackson	961,702	958,000	954,000	950,000
Josephine	110,289	107,000	107,000	107,000
Lane	2,812,664	1,330,000	1,286,000	1,282,000
Lincoln	666,705	471,000	438,000	421,000
Linn	1,465,262	1,417,000	1,251,000	1,225,000
Marion	528,369	505,000	505,000	461,000
Multnomah	227,155	30,000	132,000	133,000
Polk	220,277	163,000	156,000	154,000
Tillamook	984,874	761,000	732,000	709,000
Washington	84,693	42,000	41,000	40,000
Yamhill	22,774	21,000	20,000	20,000
Total	11,859,653	10,462,000	10,555,000	10,366,000

Source: Pacific Northwest Forest & Range Experiment Station. Includes all trees 4 inch and more in diameter, breast high.

After 1936 figures were adjusted for cutting depletion and growth and also for shifts of timber areas from reserved-for-cutting to available-for-cutting status. This accounts for the increase in Oregon in 1945 over 1944. The 1936 figures were published in the Review Number of this publication in 1936 and further explanation of those figures will be found in that issue.

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mated that a total of nearly one-half million cords of slabs, edgings, and trimmings from sawmills is used for pulp annually.

The table on Inland Empire pulpwood—for eastern Washington, northern Idaho and western Montana—was supplied by the Rocky Mountain Forest & Range Experiment Station in Missoula, Mont. In a letter from M. B. Dickerman, chief, Division of Forest Economics, U. S. Forest Service, Missoula, Mont., PULP & PAPER Industry is informed that these statistics represent conditions as of Jan. 1, 1947.

Alaskan Timber

A great virgin area for future development of a North American pulp and paper industry is Alaska. No mills exist there now but as this Review Number went to press the U. S. Forest Service was drawing up projected possible contracts for lease of timber for two pulp and paper mills.

Private industry executives who have looked into the possibilities in Alaska state that good stands are scattered, although many stands are close to the water. Other factors which previously had been known to delay any expansion in Alaska have been high cost of building a mill and mill town and the threatening and uncertain policies of U. S. Department of Interior in aggrandizing control over Alaskan sources through the aboriginal ownership claims of its Indian wards. Although a continuing threat are serious disputes between maritime unions and shipping companies serving Alaska.

All of the pulpwood in Alaska is in the U. S. Forest Service

Canadian Resources

Only two other countries in the world possess greater forested areas than Canada—Soviet Russia and Brazil.

In eastern Canada the drain on these resources has been well within the extent of natural regeneration of the forest and on the west coast where a long-term program for sustained yield is now being evolved there appears to be more timber suitable for pulpwood than for almost any other purpose.

Total land area of Canada is about 3,500,000 square miles. Of this, about 1,200,000 square miles are forested. Not all this land is productive, but the productive area measures 770,565 square miles—roughly equal to the combined area of the United Kingdom, France, Spain, Portugal, the Netherlands, Denmark and Sweden. This represents 22.2% or more than one-fifth of the total land area of Canada, but in the nine provinces of Canada 38% of the land area consists of productive forests. The forests of the Yukon and the Northwest Territories are at present only of local value.

Of the 770,565 square miles of productive forest, 430,000 square miles are accessible. In the productive forest area more than half is young growth; the remainder is already of merchantable size.

Of the forest area now regarded as economically inaccessible it is probable that in future a considerable proportion will prove of commercial value, depending on the provisions of transportation facilities and rising values. In the nine provinces of Canada the productive forested areas alone are nearly four times the area at present devoted to farming.

Climate, topography and soil conditions determine the location.

CANADIAN PULPWOOD SPECIES — CURRENT ESTIMATED VOLUMES

(Provided for this issue of PULP & PAPER INDUSTRY by the Dominion Forest Service)

Material of Sawlog Sizes*

In Millions of Board Feet†

	Spruce	Balsam	Jack and Lodgepole Pine	Hemlock	Poplar	Total
Prince Edward Island	75	25			5	105
Nova Scotia	2,714	789		684	5	4,192
New Brunswick	3,102	1,202	248	210		4,762
Quebec	32,286	17,701	1,847	72	2,540	54,446
Ontario	27,901		11,914	793	3,292	43,900
Manitoba	778	5	71		1,610	2,464
Saskatchewan	2,960	30	620		2,420	6,030
Alberta	9,000	400	3,000		4,500	16,900
British Columbia	50,222	31,484	9,782	56,662		148,150
Total	129,038	51,636	27,482	58,421	14,372	280,949

Smaller Material‡

In Thousands of Cords

Prince Edward Island	600	80		5	10	695
Nova Scotia	6,702	15,639	26	256	840	23,463
New Brunswick	30,383	16,286	2,217	66	3,943	52,895
Quebec	513,397	287,747	40,048	1,048	22,079	864,319
Ontario	209,217	29,223	61,713	500	125,073	425,726
Manitoba	6,877	385	3,253		18,800	29,315
Saskatchewan	8,290	355	2,830		53,800	65,275
Alberta	50,000	1,550	90,000		90,000	231,550
British Columbia	84,995	69,936	313,201	20,460		488,592
Total	910,461	421,201	513,288	22,335	314,545	2,181,830

Total Pulpwood Species

Equivalent Volumes in Millions of Cubic Feet of Standing Timber (Includes Sawlogs and Smaller Material)

Prince Edward Island	86,625	14,835		585	2,045	104,090
Nova Scotia	1,378,500	2,002,554	3,042	179,748	80,895	3,644,739
New Brunswick	4,234,149	2,168,700	313,701	53,712	374,585	7,144,847
Quebec	67,138,083	37,542,918	5,090,109	138,384	2,653,765	112,563,259
Ontario	30,588,708	3,419,091	9,829,587	232,167	12,602,883	56,672,436
Manitoba	974,991	46,140	396,150		2,138,590	3,555,871
Saskatchewan	1,618,170	48,105	466,890		5,640,980	7,774,145
Alberta	7,821,000	268,950	11,187,000		9,535,500	28,812,450
British Columbia	20,943,033	15,077,308	38,786,775	14,802,798		89,610,114
Total	134,783,259	60,588,801	66,073,254	15,407,394	33,029,243	309,881,951

*Probably only a minor portion of this wood will be used for pulp.
†Approx. 500 bd. ft. equals one cord. Very little of this, however is cordwood or pulpwood. The total figure in this table, 280,949 million bd. ft. equals about 562 million cords.
‡Mostly pulpwood.

CANADA'S AVERAGE ANNUAL CUT OF TIMBER AND ITS USES

Based on the 10-year period, 1930-1939

	Million Cu. Ft.	%
For fuel	863.8	34.3
For sawmill products	797.6	31.7
For pulp and paper	706.3	28.0
For hewn ties, poles, logs, etc.	151.3	6.0
Total	2,519.0	100.0

Source: Dominion Forest Service.

AVAILABLE MERCHANTABLE TIMBER BY AGE CLASSES AND SPECIES M. B. F. SCRIBNER

(American Forestry Association Survey Completed in 1946)

	(1) Douglas Fir			(2)		(3)			(4)	(5)	(6)	
	Old Growth	Big Second Growth	Small Second Growth	Big Sitka Spruce	Small Sitka Spruce	Big Hemlock	Small Hemlock	True Firs	Cedars	Hard-woods	Miscel-laneous	Total
Puget Sound—East	10,980,000	3,629,000	1,036,000	175,780	3,760	18,841,000	2,519,000	11,715,330	6,715,330	326,921	1,232,143	56,639,264
Olympic	7,856,000	982,000	845,000	3,651,000	167,000	19,876,000	2,690,000	7,167,000	6,024,547	290,355	145,610	49,694,437
Columbia River—North.	26,622,000	9,884,000	3,440,000	1,608,000	384,000	14,320,000	3,574,000	7,930,000	3,506,068	317,539	1,002,127	71,477,536
Washington Total	45,458,000	14,495,000	5,321,000	5,434,780	554,760	53,037,000	8,783,000	26,812,000	15,710,775	934,815	2,379,880	177,811,237
Columbia River—South.	14,727,000	3,509,000	1,313,000	1,687,000	446,000	7,604,000	1,443,000	2,870,000	910,368	292,413	1,190,072	36,085,343
Upper Will.-Cent. Coast	55,700,000	25,207,000	4,568,000	128,000	100,000	7,956,000	837,000	3,010,000	1,948,856	611,152	2,444,795	102,775,644
Umpqua	53,520,000	18,300,000	5,095,000	1,109,000	26,000	1,447,000	158,000	2,698,000	2,295,792	979,155	3,165,990	89,295,502
Rogue	19,570,000	1,645,000	1,033,000	40,000	10,000	14,000	14,000	4,040,000	889,231	544,585	5,229,372	33,102,865
Oregon Total	143,517,000	49,161,000	12,009,000	3,264,000	602,000	17,117,000	2,452,000	12,618,000	6,044,247	2,427,305	12,030,229	261,259,351
Grand Total—Wash. and Oregon	188,975,000	63,656,000	17,330,000	8,698,000	1,156,000	70,154,000	11,235,000	39,430,000	20,859,000	3,362,000	14,409,000	439,070,588

(1) Big Second Growth—20"-40? DBH
Small Second Growth—16"-20" DBH
(2) Big Sitka Spruce—Trees over 24" DBH
Small Sitka Spruce—Trees 16"-24" DBH
(3) Big Hemlock—Trees over 20" DBH
Small Hemlock—Trees 16"-20" DBH
(4) Includes all cedars—Western red, Port Orford, Incense, etc.
(5) Hardwoods—Trees over 12" DBH
(6) Miscellaneous—Pines, W. Larch, and Miscellaneous Softwoods

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The new Cheney Bigelow mixing box is the practical solution to your mixing problems, because its adjustable baffle assures a *thorough mix* for any weight paper or board, at any speed. The baffle eliminates any spilling or cascading of stock and water; the operator has perfect control of the baffle at all times through a conveniently-located hand wheel. Other important features make this mixing box a unique and valuable addition to the Cheney Bigelow line of pulp and paper mill equipment.

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WALL STREETERS SAY INDUSTRY IS VULNERABLE. MOST REPORTS CHEERY

This year's financial tabulation of the pulp and paper industry, an exclusive feature of the NORTH AMERICAN REVIEW NUMBER, reveal at a glance the most tremendous tonnage growth in the industry's history.

This tonnage expansion has investment counsellors pointing out to clients that "the enlargement of facilities will introduce the possibility that the industry may once again become more vulnerable to intensifying competition under more normal conditions." Executives in the industry have been equally aware of the significance of the expanding tonnage, and it should be pointed out that some of the "enlargement of facilities" were for the precise purpose of competing under more normal conditions.

A survey of opinion in the New York financial section by PULP & PAPER Industry reveals that the prophet's view paper stocks—current earnings and dividends— as at about their peak levels for the next few years, and that the pulp and paper group will not contribute "importantly" to any further rise in the general market.

This view, obtained in April of 1947, is bolstered by an anticipation of a general market rise, but pulp and paper stocks are still regarded as speculative fundamentally. Those who wish to hold some paper stocks are being advised to retain only those of sound integrated companies, although some not fully integrated are held in favor.

While PULP & PAPER Industry does not necessarily accept the prevailing Wall Street view of the industry, it is of value to examine it. In this examination, the reader should bear in mind that investment houses, by their very nature, do not extend their view to specific possibilities in new markets for paper. Their predictions are based almost wholly on the theory that production of paper tends to conform generally with the volume of production of selected nondurable

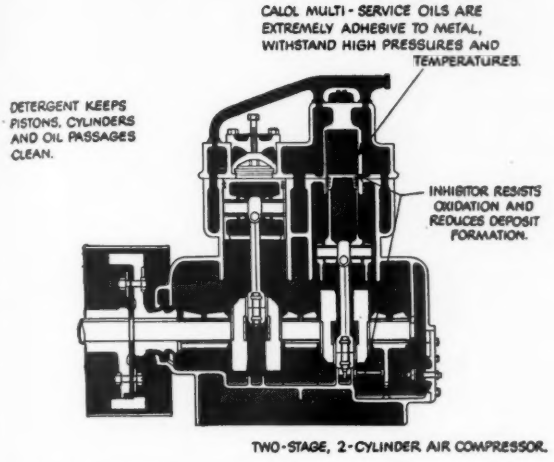
COMPARATIVE OPERATING RESULTS AND PER SHARE STATISTICS

(Sales, Profits and Income in Thousands of Dollars)

	Net Sales	*Pre-Tax Profits	*Net Income	† Per Common Share ‡Earned	oDividends	oPrice Range
b-American Writing Paper Co. (Dec. 31):						
1939	$ 6,784	$ 286	$ 239	$0.67	Nil	2½-1¼
1941	8,713	195	137	0.32	Nil	3⅛-2¼
1943	9,355	821	245	0.65	Nil	5⅜-2½
1944	9,122	568	184	0.51	Nil	7¼-4⅛
1945	9,211	308	151	0.42	Nil	11¾-5½
1946	11,397	586	306	0.85	Nil	12⅜-7½
b-Brown Co. (Nov. 30):						
1941	32,198	5,177	3,727	c25.79	Nil	c31½-25
1943	30,998	2,501	1,126	c 7.80	Nil	c36 -28¼
1944	32,329	2,513	1,298	c 8.99	Nil	c44½-28½
1945	33,284	2,143	1,220	c 8.44	Nil	c83 -45
1946	36,087	2,557	1,594	c11.03	Nil	c92 -68
Champion Paper & Fibre Co. (a-April 30):						
1937	22,415	1,851	1,557	0.99	1.12½	31⅜-12½
1939	23,406	1,638	1,330	1.12	0.05	15 - 8½
1941	42,258	7,833	3,130	2.36	0.50	11⅜- 7⅜
1943	46,249	7,099	1,971	1.29	0.50	12 - 9
1944	48,485	6,874	1,804	1.02	0.50	15⅜-11¼
1945	49,218	4,534	2,057	1.24	0.62½	27½-14¼
1946	N.A.	j4,804	j2,682	j2.22	1.00	34¼-21¼
Consoliated Power & Paper Co. (Dec. 31):						
1937	12,815	1,614	1,302	1.74	2.00	22 -14
1939	9,786	1,136	933	1.24	1.00	17 -13
1941	15,367	2,905	1,449	1.93	1.25	16¼-15
1943	17,976	3,106	1,222	1.63	1.00	15¾-12
1944	18,323	2,796	1,072	1.43	1.50	17½-14⅞
1945	17,773	1,640	921	1.23	1.00	23 -18
1946	23,780	2,613	1,552	2.07	1.25	21½-14½
Container Corp. of America (Dec. 31):						
1937	25,268	2,312	1,784	2.28	1.20	37⅜-10¾
1939	24,115	1,742	1,449	1.85	0.25	17¼- 9⅛
1941	46,714	6,742	2,327	2.98	1.50	16½-11
1943	61,164	10,384	2,684	3.70	1.50	23¾-16
1944	69,641	10,513	2,663	3.41	1.50	29⅜-20
1945	74,138	9,016	2,326	2.97	1.50	40½-26⅛
1946	91,090	13,136	7,765	7.84	3.40	54½-35½
Crown Zellerbach Corp. (a-April 30):						
1937	49,891	7,488	6,211	1.58	0.25	25¼- 8½
1939	56,527	10,324	8,119	2.42	0.50	17⅜- 9
1941	86,336	20,103	11,109	3.74	1.00	15⅜-10
1943	97,834	15,432	7,603	2.19	1.00	17 -11½
1944	98,814	13,700	7,093	1.97	1.00	22½-15½
1945	102,075	13,517	7,825	2.37	1.00	30⅞-20⅜
m1946	92,347	16,559	9,781	3.33	1.10	40¼-25
Eddy Paper Corp. (Dec. 31):						
1937	9,694	785	650	3.65	3.00	41¼-18½
1939	8,578	394	328	1.77	0.50	19¼-14⅛
1941	14,972	2,233	833	4.50	2.00	21 -13½
1943	14,369	3,008	768	4.68	3.50	28½-22
1944	16,020	3,924	1,059	6.44	4.50	38 -25
1945	16,534	3,493	848	5.16	4.50	52 -39
1946	19,582	4,765	2,925	17.78	13.00	111 -48½
Gair (Robert) Co., Inc. (Dec. 31):						
1937	21,655	794	557	Nil	Nil	15⅜- 3
1939	14,735	d624	d634	**	Nil	5⅞- 2
1941	23,393	2,465	1,127	0.80	0.25	2¾- 1¼
1943	26,576	3,146	969	0.66	0.30	4⅛- 1⅜

STANDARD ENGINEERS NOTEBOOK





TWO-STAGE, 2-CYLINDER AIR COMPRESSOR.

CALOL MULTI-SERVICE OILS HAVE WIDE USE RANGE FOR HOT-RUNNING INDUSTRIAL BEARINGS.

Multi-use oils resist high temperatures, pressure

Many of the industrial bearings and machines that operate at high temperatures and under extreme pressures can be efficiently lubricated with Calol Multi-Service Oils.

They are specially compounded. An oxidation inhibitor prevents the formation of excessive gum and sludge deposits. A detergent gradually loosens and removes lacquer or other contaminants from moving parts and oil systems. Calol Multi-Service Oils have a high metal-adherent quality and actually cling to the hottest spots.

Calol Multi-Service Oils have a wide use range. They are especially recommended for air-compressor cylinders and bearings, Diesel and natural gas engines, inclosed reduction gears and bearings.

They come in six viscosity grades: Number 45X is approximately SAE 10; number 50X, SAE 20 (medium); number 55X, SAE 20 (heavy); number 65X, SAE 30; number 75X, SAE 40; number 85X, SAE 50.

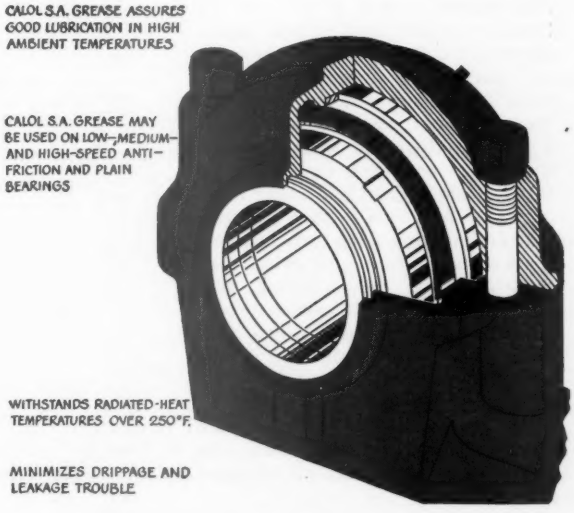
New grease lubricates in extra hot conditions

Developed especially for bearings that must operate in radiated heat, new Calol S. A. (sodium aluminum) Grease has proved satisfactory in temperatures over 250° F. It has been tested by many operators on working machines in the field. In addition, it was given a series of tests in the Navy Ball Bearing Machine, operated at 10,000 rpm, with bearing temperatures maintained at a high degree.

Calol S. A. Grease is made from a special type base and selected oils that give it high heat-resistant qualities. In use, these qualities assure minimum drippage or leakage from bearings.

Although Calol S. A. Grease is ideal in a multiplicity of services, it is specifically adapted to the lubrication of low, medium and high speed antifriction bearings used in all types of machines.

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manufactures. For the purposes of their analyses they do not investigate either the new uses developed by the war, or the projected new uses for postwar years. Nor, perhaps, have they much opportunity to weigh such intangibles as labor relations or to look into long-term wood programs. But they do recall vividly that for many years the industry's ability to produce exceeded by an uncomfortable margin the demand.

It is pointed out, in this conservative and almost pessimistic view, that the expansion from V-J Day through 1948 will more than make up for the five-year deficiency in production. It is further recalled that the problem of employing full capacity was troublesome in the years before the war, and it is insisted in the Wall Street view that full capacity was approached during the war "only because new equipment was so difficult to obtain." It is emphasized that while operations have exceeded 85% capacity since 1940, there was only one year—1920—when this happened before.

Along Wall Street the industry has a reputation for increasing capacity upon an anticipated demand increase, and the financial wizards opine that this tendency "appears to be reassuring itself." The records, however, show that the kraft industry—the only section now expanding—has never in its long history ever caught up with demand.

A further possibility seen in financial centers is that it may be difficult to make high-priced equipment pay if paper prices decline, it is believed by the experts, "in time." They are led to this belief because paper prices have risen to a greater extent than most commodities. It is admitted, however, that this fact alone need not create a fall in prices. And it is further admitted that perhaps the downturn may not come for some time, that prices may firm up even more during 1947 because demand still exceeds output. The pulp shortage, which even Wall Street will admit may persist for two years, is a further price supporting factor. But investment firms warn that the very pulp shortage works to the disadvantage of non-integrated mills under present conditions.

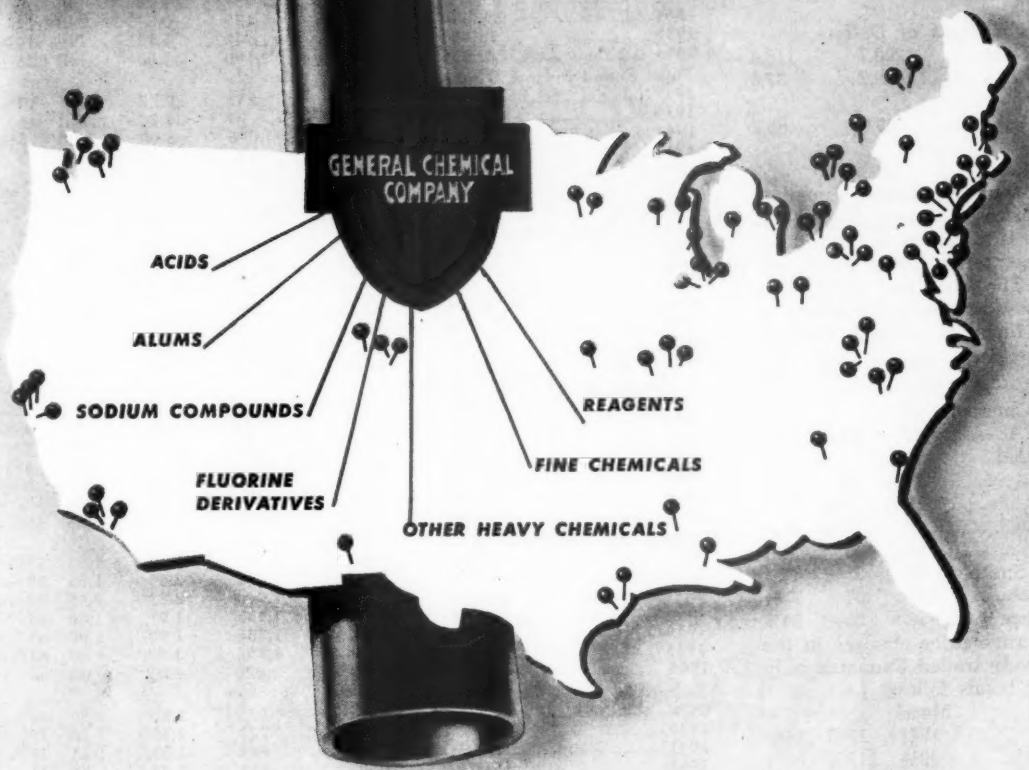
In such conditions, the experts are inclined to see profits holding up well for the pulp mills for at least the two years during which pulp, and especially market pulp, is expected to be short. They do not expect imports to return to the

COMPARATIVE OPERATING RESULTS AND PER SHARE STATISTICS (Continued)

(Sales, Profits and Income in Thousands of Dollars)

	Net Sales	*Pre-Tax Profits	*Net Income	† Per Common Share ‡Earned	oDividends	oPrice Range
1944	27,640	2,766	761	0.48	0.30	5¼- 2⅞
1945	28,093	2,209	715	0.33	0.30	10¾- 4½
1946	33,697	3,749	2,296	1.12	g	11⅞- 7
Gaylord Container Corp. (Dec. 31):						
1937	13,480	2,307	1,765	0.92	0.25	N.A.
1939	13,660	809	662	0.24	0.23⅛	6¼- 3⅛
1941	25,281	3,970	1,749	0.91	0.33⅓	4⅛- 2⅞
1943	31,708	3,153	1,243	0.61	0.33⅓	4⅞- 3¼
1944	33,945	3,851	1,287	0.63	0.33⅓	7⅞- 4⅛
1945	35,615	2,855	1,105	0.51	0.33⅓	13⅜- 7⅛
1946	44,284	8,281	5,046	2.43	0.83⅓	25 -11⅞
Great Northern Paper Co. (Dec. 31):						
1937	N.A.	2,577	2,178	2.18	2.00	47 -27
1939	N.A.	3,296	2,727	2.73	2.40	45 -33
1941	N.A.	3,815	2,432	2.44	2.50	42 -29½
1943	N.A.	3,097	1,860	1.86	1.60	36 -27¼
1944	N.A.	2,775	1,667	1.67	1.60	37½-29¼
1945	N.A.	1,529	903	0.90	1.60	47½-35½
1946	N.A.	k2,590	k1,607	k1.61	1.60	46½-37
Hammermill Paper Co. (Dec. 31):						
1937	7,443	580	450	1.25	3.00	N. A.
1939	7,330	623	463	1.83	0.50	28½-18
1941	10,703	1,351	671	3.11	1.25	25¼-15¾
1943	11,424	1,663	585	2.64	1.00	25 -17½
1944	12,570	1,591	454	1.92	1.00	29 -19⅞
1945	11,856	1,087	528	2.35	1.00	42½-27
1946	14,107	1,615	940	4.32	1.00	52¾-28
Hinde & Dauch Paper Co. (Dec. 31):						
1937	15,827	1,778	1,428	3.61	2.00	37 -16⅛
1939	13,845	1,091	912	2.04	1.00	19 -14¾
1941	22,490	3,346	1,446	3.42	1.50	16½-12½
1943	24,848	3,574	1,197	2.83	1.50	21⅜-14½
1944	24,357	3,368	1,148	2.69	1.50	25½-19¾
1945	24,054	2,749	999	2.01	1.00	33¾-25
1946	22,946	2,850	1,750	3.67	2.00	43 -26
International Paper Co. (Dec. 31):						
1937	123,487	11,780	9,135	2.47	Nil	19¼- 6¼
1939	122,290	5,709	4,894	0.14	Nil	14¾- 6⅜
1941	214,334	43,751	16,254	6.37	Nil	20 -10⅞
1943	216,123	32,451	10,120	3.01	Nil	14¾- 8¼
1944	231,572	35,833	10,560	3.26	Nil	21⅞-13⅛
1945	234,246	28,923	10,977	3.40	Nil	48¾-19½
1946	287,868	56,396	31,179	7.98	3.00	55½-38½
Kimberly-Clark Corp. (Dec. 31):						
1937	27,250	3,124	2,360	1.81	1.00	23⅜- 8⅞
1939	27,861	3,561	2,651	2.11	0.87½	19 -10
1941	36,959	5,818	3,104	2.57	1.12½	19 -12½
1943	57,488	6,694	2,550	2.00	0.87½	17 -12½
1944	61,331	6,125	2,422	1.55	1.00	21 -15¾
1945	56,882	4,557	2,447	1.66	1.00	13½-19⅜
1946	66,377	6,783	4,265	3.15	1.00	35 -21¼
Marathon Corp. (Oct. 31):						
1937	N.A.	1,087	857	p1.02	e0.75	22 - 8½
1939	13,298	724	592	p0.93	0.25	11⅞- 8½
1941	18,081	2,012	1,205	p1.59	0.37½	8¾- 6
1943	25,381	5,008	1,286	p1.49	0.50	10½- 8¼
1944	29,856	5,979	1,603	1.88	0.50	16 -13½
1945	31,941	5,602	1,360	1.39	0.50	29½-16
1946	33,244	5,019	2,734	1.91	0.77½	36½-22½
Mead Corporation (Dec. 31):						
1937	25,373	2,278	1,841	2.40	1.50	34¾-10
1939	21,987	915	744	0.46	Nil	14⅜- 6
1941	32,452	3,761	2,110	2.66	0.75	9⅝- 5
1943	36,878	3,031	1,078	0.89	0.60	10¾- 6
1944	39,920	3,292	1,138	0.98	0.60	13 - 8
1945	40,857	2,636	1,191	1.06	0.70	25 -12⅜
1946	r38,900	r3,587	r2,144	r2.54	1.15	30⅞-18⅜
National Container Corp. (Dec. 31):						
1937	3,065	357	312	0.47	0.25	14⅜- 6½
1939	4,864	434	358	0.54	0.20	10⅜- 5
1941	9,207	2,729	1,073	1.63	0.62½	12⅞- 8⅜
1943	12,969	3,191	817	1.24	0.50	13½-10¾
1944	17,656	4,474	1,191	1.80	0.90	14½-10
1945	18,767	4,112	1,186	1.68	0.85	32¾-12⅞
1946	28,776	9,063	5,606	6.82	§1.25	38⅜-24
Oxford Paper Co. (Dec. 31):						
1937	N.A.	934	800	0.75	Nil	20 - 7¾
1939	N.A.	825	674	0.42	Nil	8¾- 2

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1937 level for at least two years, if ever.

Canadian Position Improves

How production tends toward financial strength is well illustrated in the improved position of 15 Canadian pulp and paper companies. In the table below it is seen that funded debt in these fifteen major companies is down 41%, while earnings have risen 90%. Cash holdings are up 231%, and working capital up 101 percent in 1939 as compared with 1946.

In Millions of Dollars		
Funded Debt	200.7	118.4
Earnings	19.7	37.6
Working Capital	49.0	98.2
Cash Holdings	18.3	42.2

The extent of market flunctuations in prices of Canadian pulp and securities is indicated in the following representative list of junior securities. The stock and bond value trends show markedly the effects of renewed financial strength through production.

	1947 March	1945	1942
Abitibi Common	19		
Bathurst A	21	19	11½
Consolidated Paper	17½	10	1⅝
Dryden	18½	10¾	4
Donnacona	18	12¾	2¼
Fraser	50	43	7½
Howard Smith	27	23½	8½
Price Bros.	57	37	7
St. Lawrence Pref.	119	65	24½

Comparative price changes in the more actively traded Canadian pulp and paper bonds follow:

	March 1947	1945	1942
Abitibi 5c	99½	112½	57½
B.C.Pulp 6s	100½	106	89
Brown 5s	102½	101	76½
Consolidated 5½s	100	106½	62½
Donnacona 4½s	100	102½	75
Lake St. John 5½s	102	102½	78

Canadian pulp and paper companies made effective use of the favorable 1946 financial markets, and many of the larger companies put through refunding measures to give them a lower interest rate of payment. Return of dollar parity enabled them to replace their two or three-way pay bonds by bonds payable in Canadian funds only.

The Canadian investor in these companies witnessed the reduction of funded debt in 1946 from $227,000,000 at the end of 1945 to $175,000,000, amounting to roughly 23%. He saw fixed charges cut from $11,000,000 to an indicated $7,000,000 on an annual basis at the present time, or nearly 40 percent. He also saw

COMPARATIVE OPERATING RESULTS AND PER SHARE STATISTICS (Continued)

(Sales, Profits and Income in Thousands of Dollars)

	Net Sales	*Pre-Tax Profits	Net Income	† Per Common Share ‡Earned	oDividends	oPrice Range
1941	N.A.	1,996	1,057	1.44	Nil	6⅜- 3½
1943	N.A.	2,169	914	1.07	Nil	3½- 1⅜
1944	N.A.	2,216	1,024	1.36	Nil	8¼- 3¼
1945	N.A.	2,104	974	1.23	Nil	15 - 8½
1946	N.A.	3,043	1,843	3.51	Nil	18 - 9
Minnesota & Ontario Paper Co. (Dec. 31):						
1941	22,029	3,422	2,628	1.96	Nil	4¾- 2⅛
1943	23,677	2,464	1,464	1.09	Nil	9⅞- 3¾
1944	23,770	2,043	1,125	0.84	Nil	12 - 7¼
1945	24,480	2,414	1,549	1.15	Nil	19¼-11¾
1946	29,464	3,953	2,190	1.69	Nil	24 -16½
Puget Sound Pulp & Timber Co. (Dec. 31):						
1937	3,043	311	255	0.72	0.75	19½- 7
1939	3,028	116	99	d0.20	Nil	13 - 3⅜
1941	8,379	3,123	1,076	3.08	2.00	18⅜-14
1943	6,373	1,057	457	1.19	0.50	13 - 7
1944	6,469	h1,413	h938	h2.66	1.00	17 -11⅞
1945	6,217	h1,035	h603	h1.64	1.00	25½-15½
1946	7,188	2,130	1,321	3.83	1.00	27 -18
Rayonier Incorporated (a-April 30):						
1937	17,496	3,746	3,125	1.94	N.A.	N.A.
1939	16,292	2,887	2,389	1.18	Nil	19 - 6⅜
1941	31,317	9,080	3,570	2.40	0.75	18½- 8¾
1943	22,824	2,489	1,689	0.45	0.87½	15½-11¼
1944	25,970	3,624	1,839	0.61	Nil	18 -12¼
1945	27,033	2,075	1,503	0.26	Nil	25 -16
1946	t24,312	t4,065	t2,501	t1.68	Nil	33 -17¼
St. Regis Paper Co. (Dec. 31):						
1937	14,869	1,599	1,228	0.22	Nil	11¾- 2⅜
1939	15,359	705	548	0.06	Nil	4½- 1⅜
1941	30,000	5,247	3,228	0.71	Nil	2⅜- 1¼
1943	25,528	2,910	1,856	0.38	Nii	4¾- 1½
1944	48,388	5,398	1,854	0.36	Nil	6⅜- 4⅛
1945	52,501	4,344	2,211	0.94	Nil	12 - 5⅜
1946	82,782	9,349	5,564	1.29	Nil	15⅛- 8¼
Scott Paper Co. (Dec. 31):						
1937	13,844	1,603	1,249	2.19	1.55	45¼-34½
1939	18,517	2,512	1,886	2.65	1.85	52⅛-44½
1941	27,076	3,277	1,940	2.52	1.95	39½-31
1943	30,570	2,692	1,535	1.91	1.80	43 -36¼
1944	31,467	2,972	1,566	1.96	1.80	45⅛-37½
1945	37,680	3,154	1,756	1.87	1.80	61½-42⅜
1946	46,223	3,347	2,020	2.03	1,80	61 -42
Sutherland Paper Co. (Dec. 31):						
1937	8,137	997	805	2.80	1.80	39⅞-17½
1939	8,490	866	723	2.52	1.30	30½-22¾
1941	12,843	1,574	818	2.85	1.25	23¼-16⅛
1943	15,479	2,541	818	2.85	1.25	33 -26¼
1944	14,947	2,260	710	2.47	1.35	34 -29
1945	14,908	1,470	609	2.12	1.35	42½-31
1946	19,730	2,614	1,611	4.68	1.75	55¼-38
Union Bag & Paper Corp. (Dec. 31):						
1937	15,691	1,675	1,385	1.32	0.50	18⅜- 8⅞
1939	17,562	1,134	966	0.76	Nil	13⅛- 6
1941	27,871	5,619	2,168	1.70	1.00	12¾- 7
1943	33,555	2,767	1,058	0.83	0.30	11¾- 8
1944	39,021	6,722	1,584	1.25	0.75	15½- 9¼
1945	41,391	6,408	1,646	1.30	0.85	26⅞-14¼
1946	44,871	8,970	5,255	4.13	1.30	39 -23
West Virginia Pulp & Paper Co. (Oct. 31):						
1937	31,413	3,516	2,862	2.14	0.70	41 -15½
1939	29,760	1,240	1,095	0.18	0.20	19⅛- 9½
1941	47,521	6,820	4,520	3.97	1.80	20⅞-15
1943	53,715	7,662	2,610	1.86	1.25	16¾-11¾
1944	59,098	6,484	2,384	1.80	1.00	28 -16½
1945	59,188	5,442	2,142	1.63	1.00	40 -22¾
1946	67,212	8,954	5,104	4.93	2.40	53¼-32¾
Columbia River Paper Mills (Dec. 31):						
1937	N.A.	62	47	1.05	N.A.	N.A.
1939	N.A.	N.A.	d53	d3.44	N.A.	N.A.
1941	N.A.	510	340	16.67	N.A.	N.A.
1943	N.A.	141	91	4.24	N.A.	N.A.
1944	N.A.	280	155	7.77	N.A.	N.A.
1945	N.A.	407	170	8.49	N.A.	N.A.
1946	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Soundview Pulp Co. (Dec. 31):						
1937	6,537	1,987	1,627	3.07	3.00	N.A.
1939	5,768	679	565	0.90	0.25	29⅝-11

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the cost of carrying outstanding pulp and paper funded debt sliced from 4.82 percent to 3.95 percent.

To holders of junior securities this large scale capital structure revamping program has resulted in increased earning power per share. Several companies also strengthened the earning position of the common shareholders by refunding their preferred issues as well.

Reports Are Cheering

The annual reports this year were filled with good cheer and reflect the general health of the industry. Scott Paper Co., for example, showed consolidated net earnings of $2,019,614, after all charges, including provision for all taxes, as compared with $1,756,205 in 1945. After preferred dividend requirements, earnings per common share in 1946 were $2.07 as compared with $2.00 in 1945. Thomas B. McCabe, president of Scott, who returned to the company recently after two years' absence in government service, stated that the net sales for 1946 amounted to a new high record: $46,222,804. A substantial portion of this increase was from sales of "Cut-Rite" wax paper which became a Scott product in May of 1945.

Said Mr. McCabe on prices: "It was our decision after decontrol to keep our prices as low as practicable. . . The present Scott prices, put into effect at the end of 1946, reflect a relatively slight increase over the former OPA level." On general shortages: "It has been impossible for the industry to satisfy completely the demand for these products." He named the factors as heavy government purchasing, natural population increase, greater purchasing power, educational advertising, and limitations of the availability of pulp and supplies. Scott, he said, has during the past few years "strongly consolidated its position by the acquisition of plants and equipment, and this has been reflected directly in substantially increased sales volume and greater variety of products." The Scott household line has expanded—its latest additions are the waxed paper mentioned above, and "Scotties" facial tissue.

Crown Zellerbach Corp.'s report said:

"The currently high level of industrial activity and retail trade depletion of inventories during the war and development of new uses for paper have contributed to a demand considerably in excess of prewar levels, while industry-wide

COMPARATIVE OPERATING RESULTS AND PER SHARE STATISTICS

(Sales, Profits and Income in Thousands of Dollars)

	Net Sales	*Pre-Tax Profits	*Net Income	† Per Common Share ‡Earned	oDividends	oPrice Range
1941	13,019	4,814	1,794	3.42	2.00	23½-13¾
1943	10,706	1,845	810	1.40	2.00	21 -15¼
1944	11,682	1,991	754	1.29	1.40	23½-18½
1945	10,386	1,330	838	1.46	1.20	36 -21⅛
1946	12,359	3,197	2,017	3.87	1.40	45 -29⅞
Canadian—						
Abitibi Power & Paper Co., Ltd. (Dec. 31):						
1937	21,755	3,054	3,054	¶0.67	Nil	v
1939	16,146	1,660	1,660	¶d0.45	Nil	v
1941	27,038	5,626	5,626	¶2.75	Nil	v
1943	29,940	i1,931	i931	¶d1.04	Nil	v
1944	28,211	i2,294	i1,044	¶d0.95	Nil	v
1945	30,763	i3,591	i1,841	¶d0.30	Nil	v
u1946	N.A.	i13,875	i5,600	2.72	Nil	22¾-14
British Columbia Pulp & Paper Co., Ltd. (Dec. 31):						
1937	N.A.	355	225	1.86	Nil	48 - 9
1939	N.A.	d138	d147	d1.86	Nil	10 - 6
1941	N.A.	2,101	601	5.62	Nil	11 - 7
1943	N.A.	264	164	1.25	Nil	8 - 8
1944	N.A.	653	368	3.29	Nil	38 -14¾
1945	N.A.	978	440	4.01	Nil	63 -36¼
1946	N.A.	1,991	991	9.52	Nil	78 -46
Consolidated Paper Corp. Ltd. (Dec. 31):						
1940	N.A.	1,282	875	0.34	Nil	8½- 3⅛
1941	N.A.	1,520	880	0.34	Nil	4⅛- 2½
1943	N.A.	2,294	1,294	0.50	Nil	6⅜- 3
1944	N.A.	2,708	1,108	0.43	Nil	9½- 5¼
1945	N.A.	3,689	1,789	0.70	Nil	17 - 8
1946	N.A.	10,659	4,859	1.89	s0.50	21½-14½
Donnacona Paper Co., Ltd. (Dec. 31):						
1937	N.A.	50	41	0.11	Nil	17½- 7¼
1939	N.A.	11	9	0.02	Nil	N.A.
1941	N.A.	183	105	0.28	0.10	3½- 3⅛
1943	N.A.	345	195	0.52	Nil	7⅜- 3¾
1944	N.A.	474	274	0.72	Nil	11⅞- 7
1945	N.A.	539	289	0.77	0.50	18½- 9¾
1946	N.A.	1,479	776	1.87	s0.75	24 -15
Powell River Co., Ltd. (Dec. 31):						
1937	N.A.	1,977	1,481	1.11	N.A.	N.A.
1939	N.A.	3,548	2,602	1.94	N.A.	N.A.
1941	N.A.	5,627	2,672	1.99	1.80	N.A.
1943	N.A.	4,306	1,737	1.29	1.27	N.A.
1944	N.A.	4,526	2,107	1.57	1.05	N.A.
1945	N.A.	5,132	2,027	1.51	1.05	30¾-18¼
1946	N.A.	N.A.	N.A.	N.A.	N.A.	36¾-28

¶Adjusted to reflect present capitalization effective April 15, 1946.

*Adjusted for effects of renegotiation (where reported) and inclusion of special voluntary reserves created after taxes. †-Adjusted for split-ups. ‡-Disregarding preferred stock dividend arrears, if any. o-Calendar years. N.A.-Not available. d-Deficit. **Not computable on basis comparable with later years.

a-In order to conform with data for other companies, fiscal periods are those ending April 30 of following year.

b-Since reorganization. c-Per share statistics are for preferred stock.

e-Paid in 6% preferred stock (retired in 1944) g-6% stock dividend.
§Plus 10% in stock. (Footnotes to Balance Sheet Data should be read in conjunction herewith).

h-Includes capital gain from sale of Canadian subsidiary.

i-After deducting interest reserve payable.

j-28 weeks.

k-Nine months to Sept. 30th.

m-Nine months to Jan. 31, 1947, except dividends and price range which are for full year.

o-Calendar year.

p-Earnings revised from data previously reported to stockholders by company; adjustments mainly for depreciation.

r-40 weeks.

s-Paid in Canadian funds.

t-Eight months to Dec. 31, 1946.

u-Reorganization consummated April 15th; earnings are for full year.

v-Not comparable with present commonshares due to reorganization.

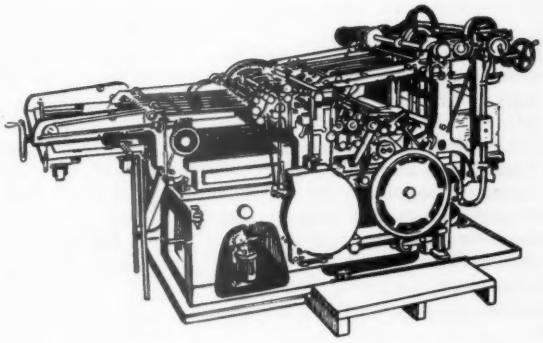


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shortage of woods labor for production of pulpwood and the relatively low volume of pulp shipments from abroad have restricted supply. Early easing of this situation does not seem to be indicated. Although our production has been maintained at high levels, it is necessary that we continue to allot our available supply among our customers. Production costs continue to increase."

For the year ending April 30, the report listed these tonnages from Crown mill:

	1946	1945
News-print papers	238,858	234,673
Coarse papers, tissues	313,683	299,789
Board	49,885	47,020
Total paper and board	602,426	581,482
Pulp for sale	24,691	56,280
Totals	627,117	637,762

Consolidated net profit for Crown Z and its Canadian subsidiaries was $7,824,983 for the year ending Apr. 30., 1946, providing common stock dividends of $2.37 per share after full preferred payments. These figures for the previous year were $7,093,085 and $1.97.

Investment in Fibreboard Products Inc. by the corporation was listed as 39.7% of preferred ($7) stock, 44.1% of class A common and 50% of class B common.

Union Bag & Paper Corp.'s diamond anniversary (75th) report was highlighted by President Alexander Calder's predictions here given in part:

"Indications are that 1947 will be an even bigger and better year for the paper industry than 1946. At the present time the pulp supply, including imports from Scandinavia and Canada, is about 3% short of the capacity requirements of the paper machines in this country. So before production can catch up with the demand for board and paper products, pulp as well as paper manufacturing capacity must be built.

"On the matter of demand, total national spendable income is still on the increase and as a result consumer purchases are running stronger than ever. Heavy consumer purchases naturally increase the consumption of all kinds of paper and paper products. It is quite probable that 1947 will see fewer strikes than 1946, in view of labor's recognition that an increase in production is important to labor as well as to the rest of the population. If that proves to be the case, we shall without doubt have a record breaking national income for the year,

COMPARATIVE SALIENT BALANCE SHEET DATA

(In Thousands of Dollars)

Fiscal Year-end	Total Assets	*Net Fixed Assets	Inventories	Net Working Capital	Funded Dept, etc.	Preferred Stock	Minority Interests	†No. Com. Shares Outstanding
b American Writing Paper Corp. (Dec. 31):								
1937	$8,782	$6,487	$1,173	$1,980	$3,072	Nil	Nil	416,028
1939	8,840	6,272	1,414	1,877	2,316	Nil	Nil	416,068
1944	9,596	4,924	1,040	3,638	2,006	Nil	Nil	360,224
1945	9,394	4,816	1,323	3,032	1,506	Nil	Nil	360,224
1946	9,585	4,771	1,459	3,272	833	Nil	Nil	360,224
c Brown Co. (Nov. 30):								
1941	44,854	26,205	7,424	12,887	17,349p	$14,448	Nil	1,999,659
1942	43,104	25,303	8,803	11,774	14,853	p14,448	Nil	1,999,659
1944	42,146	22,429	10,276	13,746	15,327	p14,448	Nil	1,999,659
1945	43,031	21,857	6,986	14,328	15,099	p14,448	Nil	1,999,659
1946	49,706	23,696	8,326	16,399	19,099	p14,448	Nil	1,999,659
Champion Paper & Fibre Co. (a April 30):								
1936	32,150	21,688	5,076	4,464	5,013	7,750	Nil	1,102,000
1939	38,385	26,582	5,026	6,401	10,415	8,779	Nil	1,101,400
1943	50,236	24,385	7,344	20,344	11,455	11,500	84	1,100,000
1944	51,899	23,336	7,284	20,905	10,900	11,500	103	1,092,000
1945	51,404	26,694	8,310	18,752	13,096	10,000	121	1,102,000
Columbia River Paper Mills (Dec. 31):								
1936	5,910	3,554	360	474	635	p680	Nil	20,000
1939	4,422	2,698	664	706	1,503	p200	Nil	20,000
1943	4,741	2,558	815	1,130	1,305	p77	Nil	20,000
1944	4,563	2,273	912	1,085	911	Nil	Nil	20,000
1945	4,884	2,251	1,088	1,008	776	Nil	Nil	20,000
Consolidated Power & Paper Co. (Dec. 31):								
1936	11,344	7,036	1,378	3,282	Nil	Nil	Nil	750,000
1939	8,755	3,469	1,790	4,292	Nil	Nil	Nil	750,000
1944	12,368	2,238	1,260	6,717	Nil	Nil	Nil	750,000
1945	12,148	2,413	2,085	7,091	Nil	Nil	Nil	750,000
1946	13,115	2,996	2,011	7,121	Nil	Nil	Nil	750,000
Container Corp. of America (Dec. 31):								
1936	23,633	17,371	2,901	3,544	6,981	Nil	Nil	653,540
1939	26,110	17,617	3,644	4,710	5,126	Nil	Nil	781,253
1944	28,119	15,500	3,737	6,635	Nil	Nil	Nil	781,253
1945	30,529	15,499	4,529	9,078	Nil	Nil	Nil	781,253
1946	42,893	19,191	6,136	13,080	Nil	Nil	Nil	990,476
Crown Zellerbach Corp. (a April 30):								
1936	104,600	66,382	11,913	13,204	19,278	52,965	1,212	2,261,199
1939	103,037	62,653	12,741	17,703	13,800	52,966	1,187	2,261,199
1943	105,164	60,386	18,591	29,814	2,573	52,966	1,254	2,261,199
1944	105,706	58,505	16,400	30,599	Nil	52,966	1,262	2,261,199
1945	111,609	62,394	19,125	32,319	2,621	52,801	1,257	2,267,375
Eddy Paper Corp. (Dec. 31):								
1936	6,730	4,532	1,407	1,491	105	Nil	Nil	177,900
1939	8,157	4,389	1,119	1,134	488	Nil	Nil	185,045
1944	11,299	1,944	998	3,745	Nil	Nil	Nil	164,535
1945	10,883	1,574	1,093	4,895	Nil	Nil	Nil	614,535
1946	10,559	1,592	1,196	5,827	Nil	Nil	Nil	164,530
Gair (Robert) Co., Inc. (Dec. 31):								
1936	18,469	12,529	3,076	2,902	4,825	p9,280	650	574,613
1939	17,093	7,819	2,032	1,662	3,563	p9,310	650	574,646
1944	15,552	7,672	2,032	4,126	3,305	3,728	650	1,133,822
1945	17,427	7,988	2,891	5,727	3,000	5,680	650	1,231,447
1946	29,894	7,701	2,720	5,655	9,475	5,680	650	1,740,440
d Gaylord Container Corp. (Dec. 31):								
1937	12,872	7,765	1,518	3,445	Nil	5,000	Nil	1,617,663
1939	12,967	8,034	1,604	3,266	Nil	5,315	Nil	1,617,663
1944	21,245	11,028	3,607	7,177	5,187	4,511	Nil	1,625,463
1945	21,169	8,231	3,504	10,155	4,842	4,483	Nil	1,665,933
1946	24,129	9,428	3,969	11,728	4,497	1,654	Nil	2,025,085
Great Northern Paper Co. (Dec. 31):								
1936	42,604	27,217	7,740	13,356	Nil	Nil	Nil	997,580
1939	43,567	29,057	6,436	12,684	Nil	Nil	Nil	997,480
1944	44,774	28,996	5,663	12,700	Nil	Nil	Nil	997,480
1945	45,550	30,003	6,729	12,210	Nil	Nil	Nil	997,480
Hammermill Paper Co. (Dec. 31):								
1936	11,882	6,309	1,805	2,833	270	3,803	Nil	180,000
1939	11,051	5,717	2,097	3,790	Nil	2,500	Nil	180,000
1944	12,716	5,204	1,912	5,180	Nil	2,420	Nil	180,000
1945	18,710	5,483	2,476	5,930	5,000	3,670	Nil	180,000
1946	20,232	8,544	2,742	6,701	5,000	3,670	Nil	180,000



P-A-S-T *Spells* FUTURE

Ever since its founding in 1852, Brown Company has stood for leadership and quality products in the Pulp and Paper industry. Notable among Brown Company's many achievements are the famous "Four Cornerstone" Products (See below).

★

★

★

Coming years will see Brown Company's past record fully sustained. Postwar plans are crystallizing now. New Plants —improved facilities—continuing research on new products and processes—"cornerstones" of leadership *always!*

THE "FOUR CORNERSTONES"

BURGESS STANDARD*

Bleached sulphite introduced generally about 1900. Its high quality established Burgess Standard as this country's leading bleached sulphite pulp.

SOLKA*

First commercial high alpha and dissolving wood cellulose—introduced in 1924, and the first wood pulp to compete successfully with cotton cellulose.

CELLATE*

First commercial highly standardized, bleached Kraft fibre. Introduced to the market in 1928.

SPECIAL DUR-ALBA*

First successful, extremely pure, white sulphite base fibre — made from deciduous wood. Introduced: 1930.

*Reg. Trade Mark

BROWN COMPANY

FOREMOST PRODUCERS QUALITY PURIFIED CELLULOSE

PULP SALES OFFICES: 500 FIFTH AVE., NEW YORK 18, N. Y. • 465 CONGRESS ST., PORTLAND 3, ME.
110 S. DEARBORN ST., CHICAGO 3, ILL. • 58 SUTTER ST., SAN FRANCISCO 4, CAL.
BROWN CORPORATION 906 SUN LIFE BLDG. MONTREAL 2, P.Q., CANADA

excluding only war years. The per capita consumption of paper in this country continues to increase, and experts have predicted that it will reach 375 lbs. per capita annually by 1950

Union Bag's net earnings in 1946 were $5,254,953, equal to $4.13 a share of capital stock outstanding after all charges including income taxes. These earnings are over three times those in 1945, which amounted to $1,646,467 or $1.30 a share.

Because of its reorganization in 1941 and its current expansion program, the report of Brown Company, Berlin, New Hampshire, is of particular interest. Consolidated net sales were $36,087,075, or $2,803,065 larger than 1945, and larger in dollar volume than in any previous year since the reorganization. Although sales in 1946 were substantially larger, the operating profit of the companies in the Brown organization was slightly smaller than in 1945, reflecting here a continuation of ceiling sale prices inadequate to cover rising costs of labor and purchased materials, together with continued high conversation cost of much non-competitive plant equipment. But substantial increases in "other income" and decreases in "other deductions" resulted in a consolidated net income after taxes of $1,593,982, which is $374,174 greater than 1945.

Typical of the situation in the North East, the company raised wages three times during the fiscal year to conform with the area pattern, and comparable raises were made for salaried employes. There were also increases to the hourly paid and salaried employes of the Brown Corp. (Canada) comparable with those granted by other pulp companies in the Province of Quebec. The modernization of this company is being described in current issues of PULP & PAPER Industry.

Edward Bartsch, now chairman of the board of directors as well as president of Rayonier Incorporated, has announced that preliminary figures for the first quarter of 1947 indicate sales of approximately $11,800,000, an increase of 63% over the same period last year. He estimated earnings for the quarter at $1.40 per share or better, on the common stock after allowing for preferred dividends, compared with six cents in the first quarter of 1946. Mr. Bartsch stated that the outlook for next year is most promising; stockholders were told that with a continuation of the improvement in earnings and barring unforeseen contingencies it was hoped

COMPARATIVE SALIENT BALANCE SHEET DATA

(In Thousands of Dollars)

Fiscal Year-end	Total Assets	*Net Fixed Assets	Inventories	Net Working Capital	Funded Debt, etc.	Preferred Stock	Minority Interests	†No. Com. Shares Outstanding
Hinde & Dauch Paper Co. (Dec. 31):								
1936	11,897	5,754	1,972	3,307	490	3,608	Nil	360,000
1939	12,565	5,987	2,085	3,702	544	3,590	Nil	360,250
1944	14,648	5,315	2,408	5,154	Nil	3,590	Nil	360,250
1945	14,997	5,368	2,538	5,655	Nil	1,470	Nil	427,824
1946	16,434	6,793	2,694	6,247	Nil	Nil	Nil	476,379
t International Paper Co. (Dec. 31):								
1936	240,555	179,178	26,588	35,250	80,730	p91,349	15,833	1,822,243
1939	219,867	158,507	25,600	35,605	58,851	p92,594	2,026	1,823,270
1944	249,196	131,402	29,228	71,122	48,796	p92,597	316	1,823,855
1945	252,358	128,125	32,054	65,465	46,568	92,596	179	1,863,862
1946	252,533	134,229	43,104	63,090	18,120	23,000	179	3,560,000
Kimberly-Clark Corp. (Dec. 31):								
1936	45,788	28,246	4,096	4,004	5,116	9,963	Nil	974,346
1939	50,858	24,508	5,141	7,688	8,600	9,963	Nil	976,346
1944	61,771	30,816	7,447	15,936	9,528	10,242	Nil	1,199,520
1945	64,337	33,741	8,160	16,785	10,000	10,242	Nil	1,199,520
1946	74,887	43,131	10,842	16,937	10,000	17,242	Nil	1,199,520
Marathon Corp. (Oct. 31):								
1936	10,966	7,160	2,199	2,425	2,350	600	Nil	800,000
1939	14,307	7,186	3,499	4,512	3,597	1,199	28	798,268
1944	29,781	9,484	4,702	16,288	10,136	5,000	61	800,000
1945	31,280	15,689	6,442	11,067	10,071	5,000	66	800,000
1946	44,543	24,724	10,613	12,550	5,424	5,000	Nil	1,300,000
Mead Corp. (Dec. 31):								
1936	29,752	20,665	3,720	4,326	7,240	3,315	1,023	619,374
1939	34,525	21,904	4,237	5,790	7,536	8,114	876	619,374
1944	37,387	19,756	5,616	9,586	6,000	7,983	153	693,610
1945	39,615	19,922	7,213	10,222	8,000	7,971	164	693,613
h Minnesota & Ontario Paper Co. (Dec. 31):								
1941	44,138	29,991	4,630	8,789	9,757	Nil	Nil	1,344,544
1944	45,180	27,338	5,801	10,982	6,310	Nil	Nil	1,344,543
1945	46,810	28,503	6,587	11,138	5,700	Nil	Nil	1,344,543
1946	48,515	29,991	9,708	11,307	2,842	Nil	Nil	1,292,522
f National Container Corp. (Dec. 31):								
1937	6,458	5,017	343	640	2,247	Nil	Nil	660,964
1939	6,787	5,188	416	709	2,343	Nil	7	660,964
1944	12,328	6,918	1,372	2,553	4,522	Nil	44	660,964
1945	15,180	8,274	2,361	4,192	4,260	2,212	54	676,330
1946	23,840	12,000	3,748	4,930	4,714	1,063	219	811,180
Oxford Paper Co. (Dec. 31):								
1936	28,560	17,426	2,242	3,803	4,580	p 8,287	Nil	340,172
1939	28,833	16,919	2,603	4,273	4,490	p10,231	Nil	380,735
1944	27,607	14,836	3,257	6,351	1,890	p10,143	Nil	380,735
1945	28,413	14,415	5,370	8,158	1,700	p10,143	Nil	380,735
1946	40,317	16,256	5,542	8,825	10,288	p10,143	Nil	380,735
Puget Sound Pulp & Timber Co. (Dec. 31):								
1937	7,146	4,841	393	350	23	2,473	Nil	251,837
1939	5,642	4,712	265	270	11	2,473	Nil	251,837
1944	10,097	4,444	726	1,027	488	1,121	Nil	326,918
1945	10,543	4,743	613	907	1,221	1,121	Nil	326,940
1946	12,377	5,439	920	1,269	1,413	1,121	Nil	326,940
g Rayonier Inc. (a April 30):								
1937	21,435	17,378	2,161	1,248	425	15,655	Nil	963,872
1939	31,530	24,124	3,559	4,322	6,500	15,655	Nil	963,871
1943	30,433	22,330	3,822	5,000	3,427	15,655	Nil	963,871
1944	37,072	23,539	3,550	6,254	9,119	15,655	Nil	963,871
1945	35,869	22,528	3,727	7,642	8,266	15,655	Nil	963,871
1946	39,400	23,520	4,986	10,055	8,419	15,655	Nil	993,871
St. Regis Paper Co. (Dec. 31):								
1936	58,698	27,704	3,173	4,325	6,910	p4,428	915	4,120,714
1939	59,123	27,278	3,066	6,279	7,899	p4,428	874	4,120,714
1944	58,777	32,179	8,373	18,455	9,708	p7,372	3,345	4,120,714
1945	69,794	31,230	11,638	23,031	15,082	p7,207	2,405	4,120,714
1946	99,170	53,845	20,590	29,070	16,756	20,000	2,404	4,620,714
Scott Paper Co. (Dec. 31):								
1936	7,749	4,508	1,710	2,146	Nil	Nil	Nil	569,980
1939	20,230	9,219	2,380	5,575	702	6,034	Nil	667,956
1944	22,362	9,851	2,613	7,123	Nil	6,030	Nil	667,942
1945	25,976	11,566	5,979	7,760	Nil	6,030	Nil	804,782
1946	28,804	13,313	5,015	9,627	Nil	6,589	Nil	871,861



Increased Sharpness of Watermark

This drive was developed primarily for controlling dandy speed compared with the speed of the wire resulting in a far superior watermark in clarity of outline. However, it also improves the sheet so that the machine could be speeded up twenty-five per cent on equal quality.

THE unit as manufactured by Sandy Hill is covered by patents both in the United States and Canada. An important feature of this design is that weighting of one side more than another is completely eliminated. The drive shafting will permit the Dandy Roll to follow any slight oscillation of the wire from side to side.

Better Formation at Higher Speeds

The Sandy Hill-Spencer Dandy Roll Drive facilitates fibre formation and closing, enhancing the finish of the sheet. It gives more even distribution in laying the sheet and perfect control for "localizing."



THE SANDY HILL IRON & BRASS WORKS
HUDSON FALLS, N. Y.

INCIDENTS FROM SMITHway PRESSURE VESSEL RESEARCH

PROJECT No. 71,074

Corrosion-resistant Smithlining can now be done with 21 different alloys

WHEN corrosion resistance first became important to the petro-chemical industry, Project No. 71,074 was started to develop a relatively low cost method of satisfactorily lining carbon-steel pressure vessels with a corrosion-resistant alloy.

Project 71,074 resulted in *Smithlining,* a patented process of resistance-welding sheets of alloy steels to a variety of steel base plates, and then forming into segments, cylinders, cones, or heads.

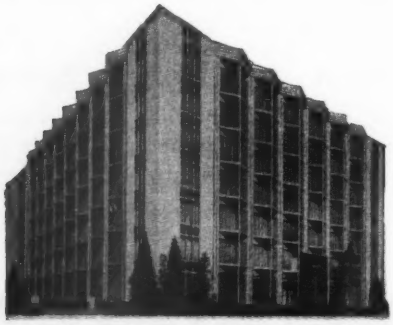
But Project 71,074 has never been closed out. It is still active. To date, it has made practical the use of 21 different alloys as linings. It has no size limitation. It provides for uniform alloy thickness to normal sheet tolerances, and permits two-surface inspection of both lining and base plates as well as chemical analysis and gauging of both.

Finally, it has permitted the successful application of lined vessels to a growing variety of corrosive services.

This unique combination of advantages gives Smithlining unusual appeal to all concerned with corrosive processing.



A. O. Smith-built resistance spot-welding machine, welding sheets of alloy steel to steel base plate.



A. O. Smith Research and Engineering Building, Milwaukee

A. O. SMITH Corporation

New York 17 • Philadelphia 5 • Pittsburgh 19 • Atlanta 3 • Chicago 4
Tulsa 3 • Houston 2 • Seattle 1 • Los Angeles 14
International Division: Milwaukee 1

MAKERS OF AUTO FRAMES • PRESSURE VESSELS • LINE PIPE • OIL-WELL CASING • BREWERY TANKS
WELDING EQUIPMENT • TURBINE PUMPS • PETROLEUM METERS • AND OTHER PRODUCTS

that a dividend on the common stock could be paid late this year or early in 1948. "In addition to the domestic demand for wood cellulose pulps there exists a large unsatisfied demand in foreign markets," Mr. Bartsch pointed out.

David L. Luke, Jr, president of West Virginia Pulp and Paper Company, reported favorable rises in the company's earnings, sales, and production during the first quarter of the current fiscal year. He announced also that an agreement had been entered into with four banks insuring $10,000,000 credit, if needed, during the next four years. He likened the commitment to an insurance premium on the company's ability to obtain funds on favorable terms. Earnings for the first quarter ended January 31 amounted to $2,210,622, equal to $2.45 per common share, after allowances for taxes and preferred dividends. This compared with $1,-112,404 and $1.23 for the average quarter of the past fiscal year. Production of paper and paperboard during the first quarter has been 163,104 tons as compared with 149,-496 tons quarterly average in 1946. Sales during the first quarter amounted to $20,188,589 as against the 1946 quarterly average of $16,-802,982.

Said Mr. Luke: "We hope to be able to maintain relatively satisfactory earnings throughout the balance of the year and for several years thereafter, so that we may gradually improve the long-term earnings record." Further about the future, Mr. Luke prophesied that "because we cannot see any low-cost opportunities for over-expansion we feel reasonably confident that our industry now stands on a firmer foundation than it has for 20 years or more." He revealed that the company plans this year to bring into operation a new paper machine at Charleston, S. C., "which will improve the balance and make the plant a more efficient unit, with a better cost basis and a better profit potential.

The net of International Paper was up sharply this year— $31,179,-048 equal to $8.50 a common share, compared with $8,546,078 or $2.14 a share for 1945, one of the most spectacular gains on the industrial horizon. Net sales for 1946 amounted to $287,867,668 for 1946 as compared with $234,245,619 in 1945. There were produced 2,671,603 tons compared with 2,488,768 tons in 1945. The funded debt was reduced from $46,568,061 to $18,120,000 at the close of 1946. Directors approved the expenditure of $22,000,000 this year for additional capacity, mill improvements and timber purchase. In 1946 expenditures for additions and improvements to mills and for woods equipment amounted to $18,-090,540.

The 1946 report of Kimberly-Clark covered a period of unprecedented corporate expansion, including two major additions to operations—at Memphis and in Ontario. This year, incidentally, marks the 75th anniversary of the company. Net sales for the year were $66,376,-574, an increase of 16.7% over the previous year.

COMPARATIVE SALIENT BALANCE SHEET DATA (Cont.)

(In Thousands of Dollars)

Fiscal Year-end	Total Assets	*Net Fixed Assets	Inventories	Net Working Capital	Funded Debt, etc.	Preferred Stock	Minority Interests	†No. Com. Shares Outstanding
Soundview Pulp Co. (Dec. 31):								
1936	7,431	5,848	576	448	900	293	Nil	418,500
1939	11,218	8,901	1,429	1,323	1,040	2,108	Nil	488,250
1944	12,619	7,860	1,442	1,656	Nil	2,108	Nil	488,250
1945	11,690	7,949	1,532	2,189	Nil	2,108	Nil	488,250
1946	13,874	8,907	968	1,436	Nil	2,108	Nil	488,250
Sutherland Paper Co. (Dec. 31):								
1936	4,826	2,728	924	1,558	Nil	Nil	Nil	287,000
1939	6,515	3,335	2,291	1,732	Nil	Nil	Nil	287,000
1944	7,996	4,078	2,012	2,788	Nil	Nil	Nil	287,000
1945	9,767	3,995	2,359	4,730	1,500	Nil	Nil	287,000
1946	12,081	5,136	2,727	5,082	Nil	Nil	Nil	344,000
Union Bag & Paper Corp. (Dec. 31):								
1936	12,715	8,679	2,112	2,946	2,077	Nil	Nil	1,045,732
1939	20,244	14,813	2,397	4,116	4,997	Nil	Nil	1,262,730
1944	26,473	15,870	3,416	6,943	5,859	Nil	Nil	1,271,437
1945	22,425	12,841	3,474	7,301	2,946	Nil	Nil	1,271,437
1946	28,385	16,379	4,613	8,357	4,136	Nil	Nil	1,271,437
West Virginia Pulp & Paper Co. (Oct. 31):								
1936	56,437	32,855	5,530	12,027	4,000	15,524	Nil	902,660
1939	61,553	38,246	6,793	16,652	9,591	15,583	Nil	902,432
1944	59,345	29,665	6,761	15,136	Nil	15,281	Nil	902,432
1945	63,524	28,201	6,860	15,394	Nil	14,825	Nil	902,432
1946	67,369	32,187	9,344	19,807	Nil	14,435	Nil	902,432
Canadian—								
r Abitibi Power & Paper Co., Ltd. (Dec. 31):								
1936	121,956	68,599	3,073	2,241	50,485	p35,882	Nil	1,088,117
1939	121,679	65,139	5,895	10,773	50,895	p35,882	Nil	1,088,117
1943	130,324	46,638	7,645	25,532	71,343	p35,882	Nil	1,088,117
1944	127,504	44,120	8,347	24,260	66,629	p35,882	Nil	1,088,117
1945	123,378	41,866	9,996	26,895	62,988	p35,882	Nil	1,088,117
1946	124,869	82,675	17,529	24,248	53,094	28,907	Nil	1,241,694
British Columbia Pulp & Paper Co., Ltd. (Dec. 31):								
1936	9,015	6,642	556	795	5,177	p556	Nil	100,000
1939	11,161	7,321	894	143	5,311	p556	Nil	100,000
1943	11,506	7,447	1,311	1,693	5,731	p556	Nil	100,000
1944	12,305	8,176	1,410	2,234	4,970	p556	Nil	100,000
1945	12,311	7,797	1,530	1,869	4,841	p556	Nil	100,000
1946	14,417	9,638	1,914	600	4,089	p556	Nil	100,000
Consolidated Paper Corp., Ltd. (Dec. 31):								
1936	67,925	56,615	5,840	d725	52,096	Nil	Nil	2,308,789
1939	60,153	47,367	7,897	7,413	51,565	Nil	Nil	2,308,789
1944	63,782	28,898	12,666	25,812	43,847	Nil	Nil	2,562,702
1945	61,055	24,980	15,219	27,112	42,260	Nil	Nil	2,563,073
1946	75,425	38,631	22,501	24,705	35,028	Nil	Nil	2,564,195
Donnacona Paper Co., Ltd. (Dec. 31):								
1936	12,392	10,890	907	777	6,584	Nil	Nil	376,572
1939	14,029	11,615	1,257	1,341	7,263	Nil	Nil	376,572
1944	15,823	12,219	2,266	2,447	5,860	Nil	Nil	376,572
1945	16,958	12,925	2,458	2,209	5,860	Nil	Nil	376,572
1946	19,073	13,116	3,521	4,424	4,988	2,500	Nil	376,572
Powell River Co., Ltd. (Dec. 31):								
1943	38,964	31,532	2,083	3,568	Nil	Nil	368	1,344,695
1944	40,537	31,603	2,186	5,377	Nil	Nil	Nil	1,344,695
1945	43,126	32,861	2,275	5,574	Nil	Nil	Nil	1,344,695

*Does not include investments and/or interests in companies not consolidated. †Adjusted for split-ups.

a–In order to conform with data for other companies, fiscal years given are for period ending April 30th of year following: b-Reorganized in March, 1937. c-Reorganized in December, 1939. d-Organized (consolidation) in June, 1937. e-Organized in June, 1941; principal predecessor recapitalized in September, 1937. f-Organized in March, 1937. g-Organized (consolidation in November 1937, h-Reorganized in February, 1941. r-Reorganization consummated on April 15, 1946. p-Preferred stock diividends in arrears.

Funded debt includes deferred interest on bonds where such condition exists.

Note: The foregoing information has been obtained from sources believed to be reliable but is not guaranteed.

LABOR TRENDS—PAYROLL STATISTICS

IN the field of labor relations, the pulp and paper industry of the U. S. and Canada has an outstanding record for friendly negotiations between management and labor on a plane of mutual respect. On the whole, the record of peace and uninterrupted operation in this industry has been unusual—to say the least—in the current period of postwar unrest and strife in nearly every other major industry.

There have been a few strikes in the paper industry, but on the broad continental front, they have been isolated, minor cases. A phenomenal record of labor peace has been established in the twelve years of industry-wide negotiation on the Pacific Coast, broken only by a short strike in one mill during the war where a CIO union attempted to supplant the AFL organization which deals annually in Portland, Ore., negotiations with the Pacific Coast Association of Pulp & Paper Manufacturers.

In early April of this year, 18 Canadian mills completed five days of friendly negotiations with AFL unions, granting a 14% increase to 15,000 employes.

Another highly satisfactory negotiation of a similar broad nature is the one held annually in Mobile, Ala., between the AFL unions with the eight mills of the Southern Kraft division of International Paper Co. There has been a movement in the Middle West states for industry-wide negotiations but the stumbling blocks have been the wide variance in types of paper made and costs of operation, as well as in cost of living indexes in different mill towns and cities.

Some of the government statistics on the wage scales in pulp and paper industry, which have been published recently in trade journals and in widely circulated government reports have not done full justice to the basic United States pulp and paper industry. They include conversion plants and a great many other variegated plants more or less associated with this industry.

We present on this page the statistics obtained from the primary mills —the mills which this magazine is interested in—and which shows a substantially higher wage scale than the government figures. That is because this primary pulp and paper industry is a highly skilled industry as far as labor is concerned. A high percentage of employes are in the skilled brackets—in fact there are so many skilled employes that the wide prominence given to "base" wage rates is generally quite misleading. An "average" wage rate in most mills is, in fact, substantially higher than the base rate—from 12 to 20 cents higher, several mill managers told PULP & PAPER Industry. One manager said only 6% of the employes in his mill were on base rates; another said only 8%.

The Pacific Coast scale of pay is still higher than anywhere else in the world. The higher cost of living index on the Pacific Coast, as related to some other industry regions, is reflected in these figures. We also publish special tables for the Pacific Coast states, because of the continent-wide interest in these statistics since in that section of the industry, the wage level has risen so high.

In the nation as a whole, and also Canada, it is also an important point to remember that about one-third of each dollar earned in this industry goes back to the employes in wages. There are, of course, many other expenses and taxes to pay out of the dollar. The trend toward higher quality products in the industry has been reflected in better returns and in better wages. This is a point worth remembering in connection with the very determined efforts now being made by the U. S. government to start up newsprint mills in parts of the continent where much higher quality pulps and papers could be made, bringing greater wealth to communities and better payrolls than the government seems to want.

Following are the average weekly

UNITED STATES PAYROLLS

Average Hourly Earnings in Cents of Productive Employees (Exclusive of Converting Employees) in Pulp and Paper Manufacturing.

(Source: Calculated from tables received from A.P.P.A.)

	June to December Inclusive									January 1947
	1938	1939	1940	1941	1942	1943	1944	1945	1946	Average Hourly Earnings
Pacific Coast	79.6	79.8	83.8	97.7	106.9	114.7	118.6	117.2	139.3	152.9
Other Regions	61.3	61.6	65.0	72.6	81.2	86.5	88.9	90.0	108.5	114.4
New England	60.8	61.2	64.0	71.5	79.3	84.0	86.5	90.8	107.2	114.9
Middle Atlantic	63.9	64.3	67.6	76.2	85.2	89.4	91.9	96.6	110.3	115.1
Lake States	65.0	65.6	68.0	74.7	82.1	86.0	89.1	93.5	110.5	118.1
Central (North)	62.6	62.4	64.4	71.9	78.7	83.1	86.0	92.7	109.2	114.5
Central (South)	54.9	55.1	59.5	66.5	76.2	79.5	83.2	87.1	99.4	104.1
Southern (East)	57.3	55.9	61.7	74.0	84.2	86.0	92.7	97.3	113.3	116.8

UNITED STATES PAYROLLS

Average Weekly Earnings of Productive Employees (Exclusive of Converting Employees) in Pulp and Paper Manufacturing.

(Source: Calculated from tables received from A.P.P.A.)

	June to December Inclusive									
	1938	1939	1940	1941	1942	1943	1944	1945	1946	Jan. 1947
New England	$22.39	$24.27	$24.35	$29.78	$32.63	$38.59	$41.21	$42.94	$46.15	$50.12
Middle Atlantic	24.04	26.74	26.29	31.97	35.84	41.11	43.44	45.64	47.26	51.00
Lake States	25.17	26.62	27.52	31.18	34.15	39.15	41.48	43.34	44.97	47.55
Central (North)	23.41	25.23	26.03	31.04	31.73	37.19	40.05	41.93	46.73	52.19
Centrol (South)	20.79	21.85	23.25	27.22	30.34	34.32	37.42	36.74	39.48	42.11
Southern (East)	21.39	21.82	24.52	28.88	34.71	38.43	43.68	43.13	45.69	53.67
Pacific Coast	26.49	30.12	32.33	36.54	43.71	50.40	51.66	49.63	52.62	59.02

NOTE—Pacific Coast figures for January 1947 were estimated by adding 10% voluntary supplement to Dec. 1946 average hourly earnings for proper comparison as this voluntary supplement was effective Jan. 16, 1947.

earnings and average weekly hours for the last half of 1946 and for Jan. 1947 (showing the contrast between the shorter work-week and higher wage level on the Pacific Coast as compared with the rest of the country):

Earnings (exclusive of Converting employes) in Pulp and Paper Manufacturing: Calculated from tables received from A.P.P.A.

June to Dec. 1946

	Ave. Weekly Hours	*Ave. Weekly Earnings*
Pacific Coast	37.8	$52.62
Other Regions (excl. Pac. Coast)	41.7	$45.42
New England	43.1	$46.15
Middle Atlantic	42.8	$47.26
Lake States	40.7	$44.97
Central (North)	42.8	$46.73
Central (South)	39.7	$39.48
Southern (East)	40.3	$45.69

Jan. 1947

	Ave. Weekly Hours	*Ave. Weekly Earnings*
Pacific Coast	38.6	$59.02
United States (excl. Pac. Coast)	43.2	$49.55
New England	43.6	$50.12
Middle Atlantic	44.3	$51.00
Lake States	40.3	$47.55
Central (North)	45.6	$52.19
Central (South)	40.5	$42.11
Southeast	46.0	$53.67

Pacific Coast figures for January were estimated by adding the 10% Voluntary Supplement to the December 1946 average hourly earnings for proper comparison, as this Voluntary Supplement was made effective January 16, 1947.

Bigger Earnings Increase

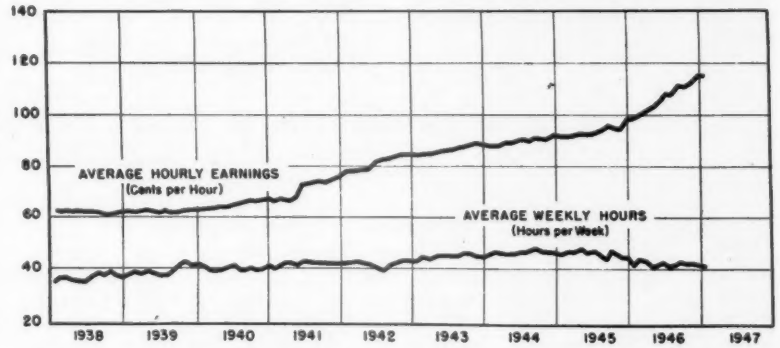
The pulp and paper unit of the Department of Commerce says that in the U. S. since the end of World War II, there has been a greater increase in the hourly earnings for the pulp and paper industry than there has been for all industries. Average hourly earnings in the pulp and paper industry for the first 9 months of 1946 increased 12% over the 1945 average, while hourly earnings for all industries showed an increase of only 4%. Since 1939, however, the increase in all industries, the nondurable industries, and the paper and pulp industry has been between 65 and 70%.

The year 1947 should witness continued improvement in worker attitude and ability, says the U. S. Department of Commerce. This is indicated by the steady, though slow, decline in the rate of accession and separation. As the influences of war become further removed, it is to

UNITED STATES
PAPER PRODUCTION AND OVERALL LABOR COST PER TON OF PAPER
(PULP OPERATIONS NOT INCLUDED)



AVERAGE HOURLY EARNINGS AND AVERAGE WEEKLY HOURS OF WORK
ALL PRODUCTIVE EMPLOYEES



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Top chart shows the average labor cost per ton of paper (not including pulp operations) as indicated by the reports from mills contributing to the survey. For the sake of comparison, total paper production is also shown on the chart.

The lower chart shows graphically the historical records of average hourly earnings, and average weekly hours of work. The hourly earnings rate is obtained by dividing pay rolls by the man hours actually worked. Thus the hourly rate shown is distorted by whatever overtime earnings are included in the pay rolls.

STATE OF OREGON

Year	Payroll	Work Days	Approximate Number Employees
Fiscal Year 1927-1928	$2,691,220.18	581,833	1,939
Fiscal Year 1928-1929	2,946,218.92	640,724	2,136
July to Dec., 1931, Inc.	1,017,435.13	235,114	1,566
Calendar Year 1932	1,896,692.09	504,311	1,681
Calendar Year 1933	1,819,904.95	535,789	1,786
Calendar Year 1934	2,577,436.84	700,842	2,336
Calendar Year 1935	2,984,889.22	778,547	2,837
Calendar Year 1936	3,578,624.01	839,063	2,697
Calendar Year 1937	4,298,917.22	857,696	2,861
Calendar Year 1938	3,207,313.93	596,405	2,052
Calendar Year 1939	3,089,061.69	580,161	2,044
Calendar Year 1940	3,910,458.40	674,075	2,338
Calendar Year 1941	4,800,939.96	742,011	2,577
Calendar Year 1942	5,465,656.77	759,156	2,622
Calendar Year 1943	6,372,006.72	769,963	2,695
Calendar Year 1944	7,028,481.01	877,478	3,006
Calendar Year 1945	7,948,596.83	673,787	2,945
Calendar Year 1946*	9,345,541.14	691,729	3,079

*One mill omitted. We did not receive data from Spaulding Pulp & Paper Co.

Source: Data from Oregon State Accident Commission plus information we obtained from certain mills.

Data from July 1, 1929, to June 30, 1931, not available.

be expected that the turn-over rate will continue to decline.

The general feeling expressed to a U. S. census field staff is that a greater number of workers will be available for mill and woods operations in 1947 tthan in 1946. There is also a feeling that 1947 will see further improvement in workers' skill and attitude. Increased labor costs are also indicated.

Current negotiations for wage increases in the automobile, steel, coal and textile industries will undoubtedly influence labor costs in 1947. These negotiations, if successful, could raise the general wage level for all industries. Should the general wage level rise, the rates in the pulp and paper industry will be vulnerable to further increases in 1947.

U. S. LABOR TRENDS

	Employes (thousands)	*Weekly earnings*
Paper and allied products:		
Sept. 1946	368.0	$44.47
Sept. 1945	312.0	$40.96
Paper and pulp:		
Sept. 1946	167.7	$47.57
Sept. 1945	142.0	$44.46
Envelopes:		
Sept. 1946	10.4	$41.93
Sept. 1945	9.5	$38.12
Paper bags:		
Sept. 1946	14.7	$37.89
Sept. 1945	12.2	$36.28
Paper Boxes:		
Sept. 1946	87.4	$41.13
Sept. 1945	76.8	$36.86

Source: Bureau of Labor Statistics.

Canadian and U. S. Data

The latest figures available for Canada, show that in 1945 a total of $80,462,644 was paid to 39,996 employes. This compares with U. S. statistics of $366,000,000 paid to 167,000 employes. In the U. S., those figures compare with an industry in 1909 which paid only $40,804,000 to 76,000 employes. And in Canada, back in 1919, there were less than $33,000,000 paid to 26,000 employes. (Interesting similar comparative data and figures on tons produced per employe, wages per ton, index unit production per man hour, etc, are published in this issue in section on "Salient Facts.")

STATE OF WASHINGTON PAYROLLS AND HOURS WORKED

	ALL HAZARDOUS INDUSTRY OF STATE				PULP AND PAPER MANUFACTURING			
			Increase or Decrease Compared With Preceding Year				Increase or Decrease Compared With Preceding Year	
Year.	Payroll	Workmen Hours	Payroll	Hours Work	Payroll	Workmen Hours	Payroll	Hours Work
1927	$255,669,929	396,071,584			$4,855,526	7,710,848		
1928	271,223,403	414,002,480	6.08%	4.53%	5,573,223	8,507,600	14.78%	10.33%
1929	288,903,912	437,600,400	6.52%	5.70%	7,845,335	12,275,072	40.77%	44.28%
1930	260,002,808	397,369,096	−10.00%	−9.19%	9,110,285	13,874,832	16.12%	13.03%
1931	188,705,890	317,120,680	−27.42%	−20.19%	6,990,889	11,360,944	−23.26%	−18.12%
1932	131,893,000	255,078,920	−30.11%	−19.56%	5,063,638	8,960,224	−27.57%	−21.13%
1933	129,023,888	260,928,662	−2.18%	2.29%	5,166,375	9,693,579	2.03%	8.18%
1934	161,702,804	284,179,483	25.33%	8.91%	7,435,151	11,835,457	43.91%	22.10%
1935	187,578,233	312,935,429	16.00%	10.12%	8,131,888	12,560,285	9.37%	6.12%
1936	241,960,112	379,926,777	28.99%	21.41%	9,858,151	14,638,927	21.23%	16.55%
1937	286,480,085	412,743,811	18.40%	8.64%	12,607,622	16,305,933	27.89%	11.37%
1938	267,784,196	379,432,496	−6.53%	−8.07%	10,227,766	12,254,194	−18.88%	−24.85%
1939	303,602,602	413,236,113	+13.38%	+8.91%	11,919,822	14,197,262	+16.54%	+15.86%
1940	345,887,756	458,512,732	+13.93%	+10.96%	14,517,595	16,905,387	+21.79%	+19.07%
1941	475,291,383	561,751,286	+37.41%	+22.52%	17,236,948	18,234,058	+18.73%	+7.86%
1942	815,109,078	776,362,062	+71.50%	+38.20%	20,724,118	19,642,765	20.23%	7.73%
1943	1,120,516,847	937,602,553	+37.47%	+20.77%	19,879,950	16,787,877	−4.07%	−14.53%
1944	1,270,266,925	1,003,431,671	+13.36%	+7.02%	21,865,943	17,411,977	+9.99%	+3.72%
1945	979,223,289	787,182,567	−22.91%	−21.55%	21,995,846	17,491,211	+.59%	+.46%
1946	878,912,863	679,348,979	−10.02%	−13.69%	25,083,023	17,612,908	+14.%	+.01%

Source: Department of Labor and Industries, State of Washington.

CALIFORNIA EMPLOYMENT AND PAYROLL DATA

(Based on all contribution reports submitted to department—Latest year available is 1945)

	1943			1944			1945		
Industry	Total Wages Paid	No. of Plants (a)	No. of Workers Jan., Dec.	Total Wages Paid	No. of Plants (a)	No. of Wkrs. Dec.	Total Wages Paid	No. of Plants (a)	No. of Wkrs. Dec.
Total	$19,194,995	136	8,294 8,245	$20,683,393	145	8,712	$22,787,169	156	8,744
Coated and Glazed Paper	1,488,545	8	802 634	1,541,469	8	664	1,697,649	8	634
Paper Envelopes	1,809,274	14	832 780	1,802,058	14	682	1,969,892	15	634
Paper Bags	1,386,903	13	761 740	1,832,669	16	892	2,218,506	17	887
Paperboard Containers and Boxes (c)	11,050,975	58	4,419 4,543	6,549,062	53	2,716	7,428,882	57	2,818
Pulp Goods and Paper Products, not Elsewhere classified (b) (c)	3,459,298	43	1,480 1,546	8,958,135	54	3,758	9,472,240	59	3771

(a) Each branch of a multiple establishment—concern is counted as a separate establishment.

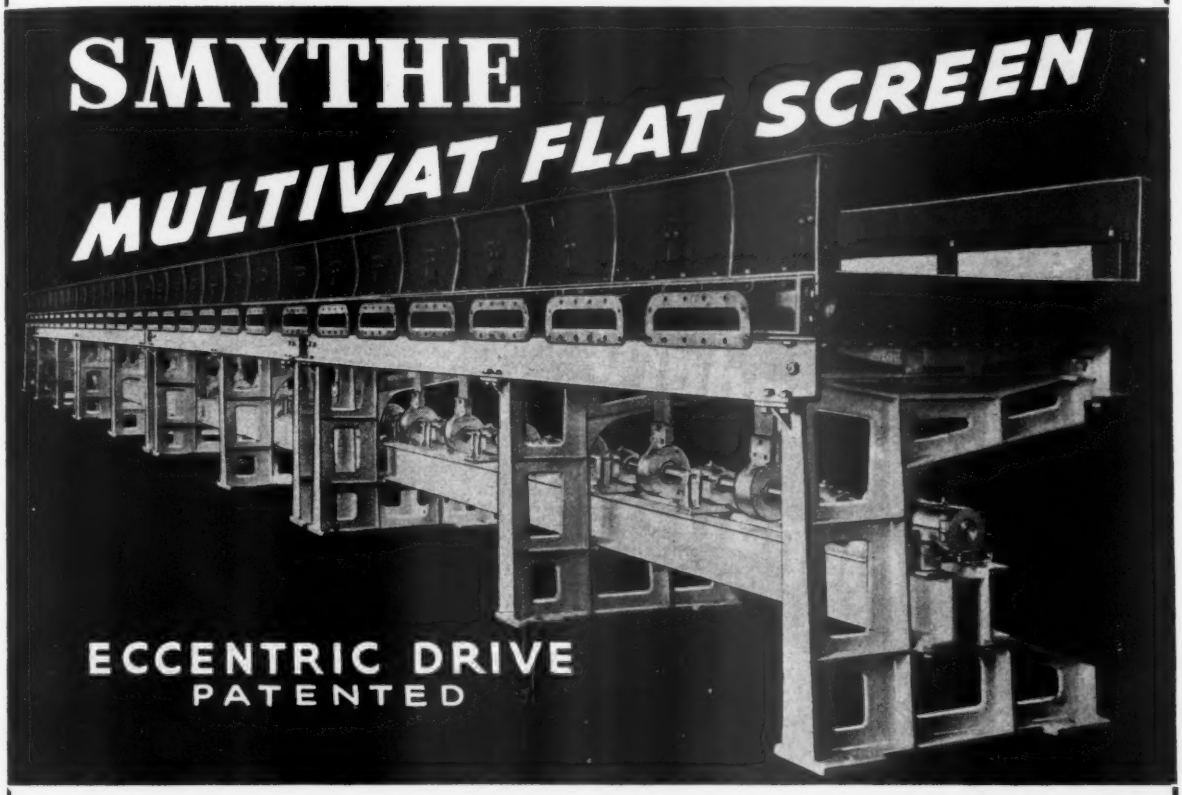
(b) Includes branches of such firms as pulp mills, paper mills and paperboard mills.

(c) Note considerable change between years 1943 and 1944 in classifications "Paperboard Containers and Boxes" and "Pulp Goods and Paper Products, not elsewhere classified." This is due to changing industrial classification of firms manufacturing paperboard as well as making containers and boxes from "Paperboard Containers and Boxes" group (firms fabricating containers from purchased stock) to "not elsewhere classified" group.

Source: California Department of Employment affiliated with Social Security Board Report 127A, No. 47 for 1943, No. 52 for 1944.

"The first repairs we have had to make (on our SMYTHE MULTIVAT BRONZE FLAT SCREEN) during the ten years it has been in use."

Excerpt of letter dated Jan. 29th, 1947, from paper mill established 1872. Materials furnished to make repairs cost $5.00.



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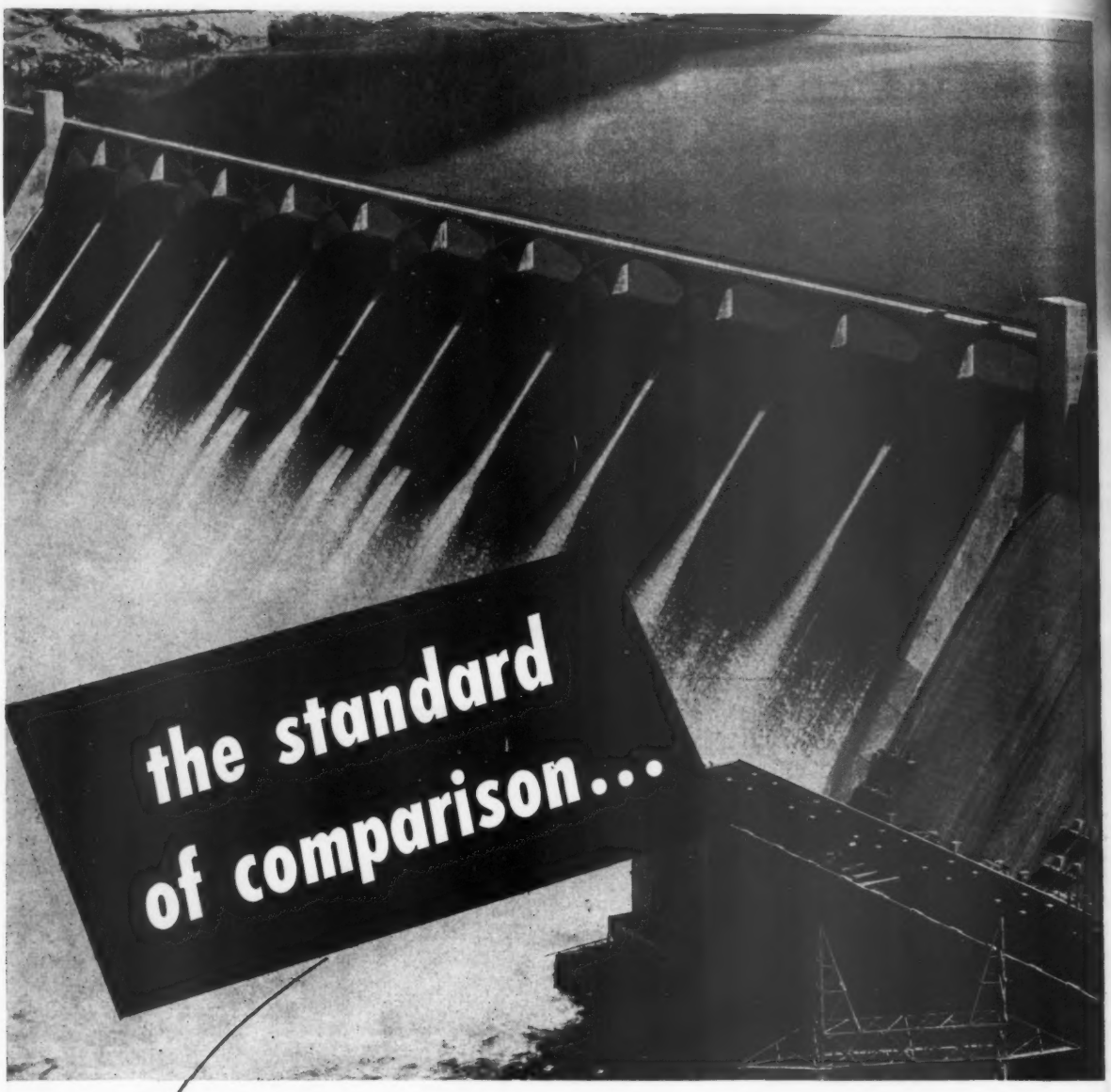
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MORE MADE THAN EVER BEFORE. EXPLANATION GIVEN FOR "SHORTAGES."

NORTH AMERICAN mills are currently manufacturing more newsprint than ever before in history, and newspapers are using more newsprint than ever before—yet readers of the daily press are frequently being told dogmatically that there is a newsprint "shortage."

All past records for production were smashed in 1946, and 1947 is on its way to being even a bigger production year, yet there is an insistent clamor for more newsprint which has brought about a U. S. congressional investigation.

What is really behind all this clamor, of course, is not a shortage, but the results of maldistribution of newsprint stocks. Big metropolitan Sunday papers are running 80 to 100 pages and the big dailies average 27-30 pages, while many small newspapers are forced to reduce size or even pass issues. Heavy advertising lineage in large papers was the spur to this lopsided growth, but it must also be remembered that under wartime restriction it was the big papers that made the biggest paper cuts. Even without the appeal of war news and headlines, circulations of newspapers now are at highest levels on record.

Highest Quarter On Record

The Canadian mills produced 112,827 tons more newsprint in the first quarter of 1947 than in the first quarter of 1946, an increase of 11.6%. Output in the United States was 5,665 tons or 2.9% more.

In Newfoundland production was 4,480 tons or 5.0% more. Total North American increase of 122,972 tons for the first quarter 1947 was 9.8% over 1946 figures, and higher than in any preceding similar period.

Regarding the future, G. A. Ware, writing the annual report for the Newsprint Service Bureau, of New York, says:

"The current outlook for the newsprint industry in North America is for continued high demand. With the improvement in the situation compared with war years, with regard to the supply of raw materials and labor, it is possible that there may be a sizeable increase in production. Even if there should be some business recession in 1947, the world usage of newsprint is expected to absorb all that this continent can produce."

In round numbers 5,277,000 tons of newsprint paper were produced in 1946 on the North American continent. This exceeded by 333,000 tons or nearly 7% the former high record established in 1937. In making comparisons with 1937 production it is well to remember that a large part of the output in that year went into consumers' stocks. Last year there was no such accumulation of stock since newsprint was used as fast as it was made. Production in 1946 was 961,000 tons or 22% greater than in 1945 and represented the largest tonnage increase recorded in any two consecutive years. In ten of the 12 months, production was higher than in any similar months. Only June and September failed to exceed the earlier records.

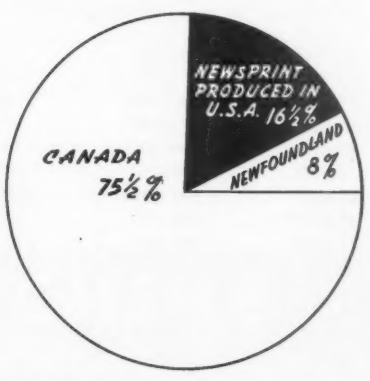
Canadian newsprint production amounted to 4,143,000 tons or 78½% of the total. U. S. mills produced 771,000 tons or a little more than 14½%, while Newfoundland's output totalled 363,000 tons or 7%. Canadian and Newfoundland totals for

U. S. Newsprint Industry's Share Of Domestic Market Continues to Decrease

Each circle here represents the total amount of newsprint in the United States available for consumption in that year, with percentages supplied from domestic and foreign sources.



1946—



1945—



1915—

the year exceeded those for any similar 12-month period while United States production, with the exception of the two preceding years, was lower than in any year since the beginning of the century.

The gain in Canadian production last year over 1945 amounted to 884,000 tons or 27 percent; the increase in the United States was 46,000 tons or nearly 6½%, while Newfoundland's output exceeded that of the previous year by 30,000 tons or 9 %. The quantity of newsprint paper produced on Canadian machines last year was 495,000 tons greater than the previous high record of 1937. Newfoundland mills turned out 12,000 tons more than in 1940 which was their best previous year. On the other hand, production in the United States was 913,000 tons below the peak year of 1926.

Shipments from North American mills in 1946 amounted 5,258,000 tons and were 980,000 tons above 1945. They were however, 19,000 tons below production in 1946 resulting in a corresponding increase in manufacturers' stocks.

These newsprint mills had again broken all past records in the first

Newsprint Prices

On Jan. 1, 1946, the price of newsprint under OPA was $67.00 a ton. By Apr. 1, 1947, it had reached $90, the new price announced on that date.

	Price	Pct. Inc.		Price	Pct. Inc.
1915	$41.78	----	1941	$50.00	nil
1916	51.78	24	1942	50.00	nil
1917	63.78	48	1943	54.66	9
1918	64.30	54	1944	58.00	16
1919	79.40	90	1945	61.00	5
1921	111.45	----	1946	67.00	10
1934	40.00	----	1947	90.00	34
1940	50.00	----			

NEWSPRINT EXPORTS FROM CANADA

(Short Tons)

	U.S.A.	Overseas	Total
1946	3,323,000	534,000	3,857,000
1945	2,534,000	525,000	3,059,000
1944	2,409,000	391,000	2,800,000
1943	2,545,000	265,000	2,810,000
1942	2,792,000	213,000	3,005,000
1941	2,762,000	500,000	3,262,000
1940	2,586,000	657,000	3,243,000
1939	2,206,000	452,000	2,658,000
1938	1,938,000	486,000	2,424,000
1937	2,899,000	556,000	3,455,000
1936	2,399,000	594,000	2,993,000
1935	2,052,000	523,000	2,575,000
Average	2,537,000	475,000	3,012,000

SOURCES OF NEWSPRINT USED IN THE UNITED STATES

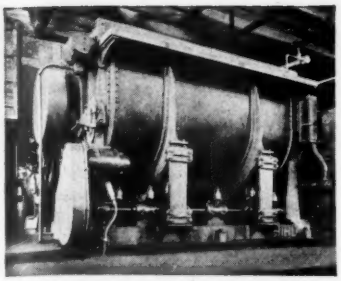
(Tons in Round Numbers)

Source: News Print Service Bureau

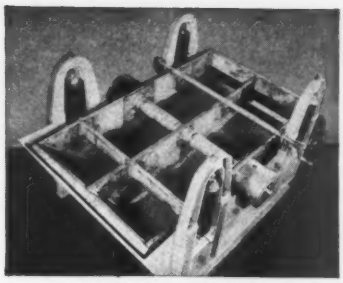
	U. S. Production	U. S. Exports	Imports into the U. S. From: Canada	Newfoundland	Europe	Available for Consumption
1913	1,305,000	43,000	219,000	----	1,000	1,482,000
1914	1,313,000	61,000	310,000	----	5,000	1,567,000
1915	1,239,000	55,000	367,000	----	1,000	1,552,000
1916	1,315,000	76,000	468,000	----	----	1,707,000
1917	1,359,000	94,000	558,000	----	1,000	1,824,000
1918	1,260,000	97,000	596,000	----	----	1,759,000
1919	1,375,000	111,000	628,000	----	3,000	1,895,000
1920	1,512,000	49,000	679,000	1,000	50,000	2,193,000
1921	1,225,000	17,000	657,000	----	135,000	2,000,000
1922	1,448,000	26,000	896,000	----	133,000	2,451,000
1923	1,485,000	16,000	1,109,000	----	200,000	2,778,000
1924	1,481,000	17,000	1,197,000	4,000	156,000	2,821,000
1925	1,530,000	23,000	1,295,000	20,000	133,000	2,955,000
1926	1,684,000	19,000	1,658,000	94,000	100,000	3,517,000
1927	1,486,000	12,000	1,776,000	89,000	122,000	3,461,000
1928	1,418,000	11,000	1,926,000	114,000	116,000	3,563,000
1929	1,392,000	19,000	2,195,000	132,000	96,000	3,796,000
1930	1,282,000	10,000	1,989,000	156,000	134,000	3,551,000
1931	1,157,000	10,000	1,754,000	160,000	151,000	3,212,000
1932	1,009,000	8,000	1,533,000	114,000	144,000	2,793,000
1933	946,000	11,000	1,545,000	95,000	153,000	2,728,000
1934	961,000	23,000	1,956,000	107,000	147,000	3,148,000
1935	912,000	23,000	2,062,000	124,000	197,000	3,272,000
1936	921,000	15,000	2,422,000	87,000	243,000	3,658,000
1937	946,000	17,000	2,899,000	124,000	294,000	4,246,000
1938	820,000	6,000	1,938,000	94,000	243,000	3,089,000
1939	954,259	13,000	2,206,000	104,600	310,000	3,561,859
1940	1,013,000	44,000*	2,586,000	157,000	34,000	3,746,000
1941	1,058,000	73,000*	2,762,000	217,000	3,000	4,015,000
1942	953,000	42,000**	2,900,000**	120,000**	None	3,800,000
1943	805,000	35,000**	2,792,000**	110,000**	None	3,250,000
1944	717,120	40,161**	2,430,000**	100,000**	None	3,650,000
1945	724,000	18,000	2,534,000	142,000	None	3,362,000
1946	771,000	8,000	3,272,000	205,000	13,000	4,263,000

*Includes paper which is not standard newsprint. Standard newsprint exports from the U. S. during 1940 did not exceed 15,000 tons; during 1941 the exports did not exceed 25,000 tons.

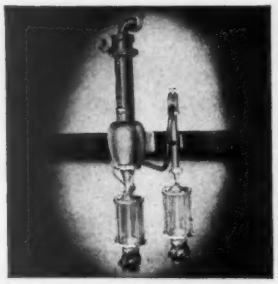
**Dept. of Commerce figures and includes non-standard newsprint.



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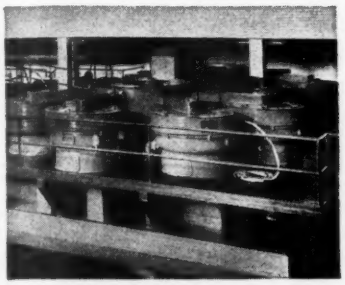


2. The **JONSSON SCREEN** has proved the ideal knotter for all kinds of pulp and for brown stock ahead of washers; the Screen for straw and waste paper stocks, too.

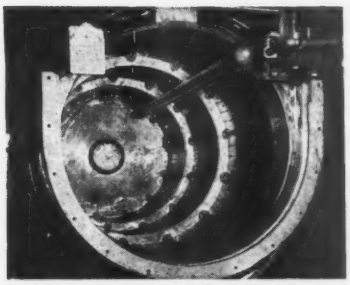


3. The **BIRD DIRTEC** is the most effective means of removing dirt ahead of the paper machine by the low cost pressure-drop principle; ideal for handling screen tailings also.

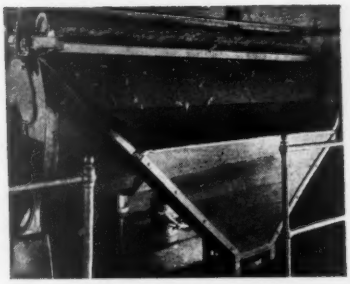
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4. The **BIRD CENTRIFINER** produces cleanest paper of fine grades and specialties by triple centrifugal treatment.

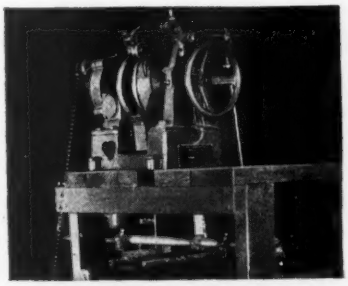


5. The **BIRD OSCILLATING SHOWER PIPE** keeps screen plates and cylinder molds clean with minimum shower water. Pays for itself out of the savings in water, fibre and heat.

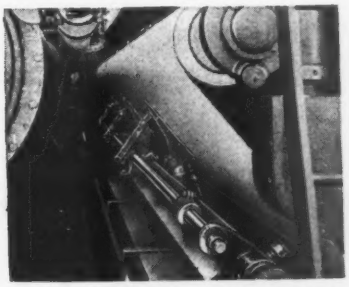


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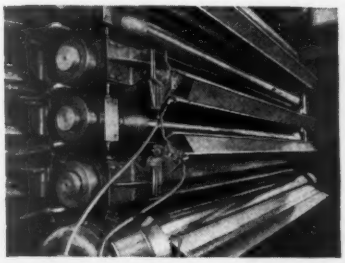
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7. The **BIRD CONSISTENCY REGULATOR** holds pulp and paper stock consistency to not more than 0.1% heavier or lighter than desired; thoroughly dependable, trouble-free.



8. The **VICKERY FELT CONDITIONER** keeps press felts continuously clean and absorbent without midweek shutdowns.



9. **VICKERY DOCTORS** keep all papermaking roll surfaces in shape to do their best work at all times.

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two months of this year—and were showing no sign of let-up. Price increase along with a 14% wage increase in Canadian mills were assuring the prospect of new records in 1947.

The Canadian mills had produced 74,472 tons more in the first two months of 1947 than in the first two months of 1946, which was an increase of 11.7 percent. The output in the United States was 3,053 tons or 2.4 percent more than in the first two months of 1946; in Newfoundland production was 3,714 tons or 6.4 percent more, making a total increase of 81,239 tons, or 9.9 percent more than in the first two months of 1946, and also was higher than in any preceding similar period.

Senate Hearing on Newsprint

At a recent U. S. Senate committee hearing on the newsprint situation, R. M. Fowler, president of the Canadian Pulp & Paper Association, questioned the use of the word "shortage" in connection with present U. S. newsprint supply and other testimony was presented showing that organized daily newspapers (members of Am. Newspaper Publishers Assn.) were obtaining 27½% more newsprint in 1946 than in 1945 and 6½% more than in 1941.

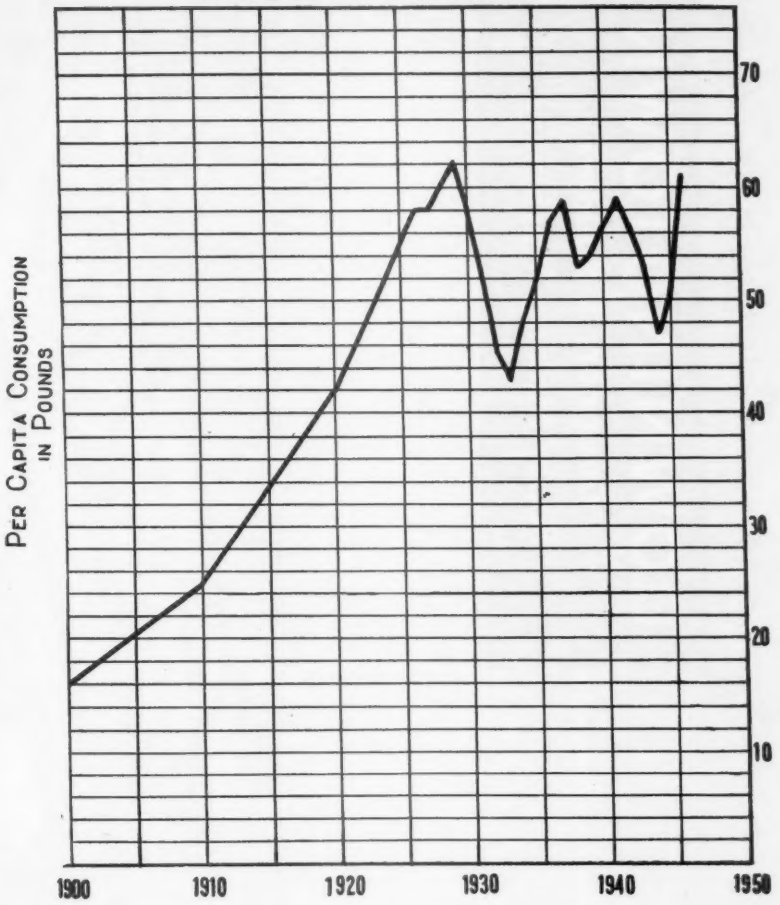
Some other interesting statistics showing lopsided distribution and presented as testimony: Just 100 U. S. papers got 90% of the increased tonnage in 1947. Just 200 dailies were getting 68% of total tonnage in 1946. The total adds up to only 460 dailies for 90% of the tonnage.

Mr. Fowler pointed out that the newsprint problem was one of bringing all the world's 9,800,000 tons of annual newsprint capacity into production. Of the 123 machines in Canada for newsprint, only one was idle and this was at Bromptonville and was being reconditioned for start-up this summer.

Mr. Fowler said it was useless to talk about building new mills as it would be three years before they could operate. This problem would probably not exist then.

He held that present U. S. supplies were adequate on any test basic for "a free press," that Canadian mills have sought to avoid maldistribution but want no part of any control or regulatory power, and that a revival of U. S. rationing probably would be ineffective and might obligate the Canadian government to regulate exports to all countries. He said shipments to other countries than U. S. were on the decrease.

PER CAPITA CONSUMPTION OF NEWS PRINT IN THE UNITED STATES



U. S. CONSUMPTION OF NEWSPRINT

Year—	Population	Newsprint Tons	Paper Used Per Capita
1935	127,521,000	3,300,000	51.7 lbs.
1936	128,429,000	3,650,000	56.8 lbs.
1937	129,257,000	3,830,000	59.3 lbs.
1938	130,215,000	3,458,000	53.1 lbs.
1939	131,878,000	3,550,000	54.1 lbs.
1940	132,817,000	3,730,000	56.2 lbs.
1941	133,923,000	3,930,000	58.7 lbs.
1942	134,633,000	3,800,000	56.4 lbs.
1943	136,497,000	3,650,000	53.5 lbs.
1944	138,101,000	3,250,000	47.1 lbs.
1945	139,621,000	3,480,000	49.8 lbs.
1946	140,840,000	4,296,000	61.0 lbs.

Status of Newspapers in U. S.

It has been calculated that the public paid $889,488,000 for newspapers (daily and Sunday) in U. S. and Canada in 1946, which was 10.7% above what they paid in 1945. Newspapers, as well as magazines and radio, showed increases in advertising, but for newspapers, the increase was the greatest.

An interesting critique of newspapers was concluded and made available in March of this year. Although not published widely in newspapers for perhaps obvious reasons, a $215,000 inquiry was financed by the Encyclopedia Brittanica and Time, Inc., and its "Commission on Freedom of the Press" headed by Dr. Robert M. Hutchins, came to the conclusion that these three factors endanger its freedom:

1. Its very importance has made it so big that it is beyond the reach

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of many people for expressions and ideas.

2. The few who are able to use the press are not giving the service necessary for a democratic society.

3. If the owners don't stop certain practices themselves, society will undertake to regulate the press.

Not well known by the North American public was the contrasting conditions under which newspapers are operating outside of the United States and Canada. Shortages of newsprint were keeping papers down to only four or eight pages in London, Paris, Moscow and other cities. Government controls were in effect in many countries.

The official price of newsprint in France recently was $275 a ton. In Italy it hit $342 a ton. Sale of 20,000 tons of Russian newsprint to newspapers in Chile was being negotiated. In Buenos Aires European suppliers were asking $195 to $200 a ton. But very little newsprint was represented by these prices.

Sweden planned to export about 100,000 tons of newsprint in 1947, about the same as in 1946. Finland shipped 165,151 tons for the first eleven months of 1946, with 21,634 tons going to South America.

Comparison Between Number of Companies Producing Newsprint in U. S. in 1926 and 1946

(According to WPB Task Committee. Estimates made before early last year.)

	Capacity 1926	Tons Estimated 1946
Alexandria Paper Co.	15,000	.....
Algonquin Paper Co.	29,000	.....
Cliff Paper Co.	13,000	.....
Con. Water P. & Pa. Co.	102,000	.....
Crown Zellerbach Corp. (and predecessors)	174,000	(?) 219,000
Cushnoc Paper Co.	20,000	.....
De Grasse Paper Co.	56.000	.....
Dells Pulp & Paper Co.	12,000	.....
Escanaba Paper Co.	370.000	.....
Finch, Pruyn & Co.	44,000	10,000
Flambeau Paper Co.	14,000	.....
Gilman Paper Co.	17,000	.....
Gould Paper Co.	30,000	.....
Grandfather Falls Co.	11,000	.....
Great Northern P. Co.	257,000	300,000
Great Western Paper Co.	20,000	.....
Hawley Pulp & P. Co.	9,000	56,000
Hennepin Paper Co.	12,000	.....
High Falls Pulp & P. Co.	8 000	.....
Inland Empire Paper Co.	29,000	20,000
International Paper Co.	323,000	.....
Blandin Paper Co.	22,000	.....
Maine Seaboard P. Co.	.....	104,000
Manistique P. & P. Co.	20,000	.....
Minn. & Ontario P. Co.	76,000	.....
Nekoosa-Edwards P. Co.	10,000	.....
Northwest Paper Co.	14,000	.....
Oswegatchi Paper Co.	16,000	.....
Oswego Falls Corp.	11,000	.....
Pejepscot Paper Co.	41 000	.....
St. Croix Paper Co.	55,000	75,000
St. George Paper Co.	10,000	.....
St. Regis Paper Co.	115,000	.....
Sherman Paper Co.	16,000	.....
Southland Paper Mills	.....	55,000
Tidewater P. Mills Co.	32,000	.....
Watab Paper Co.	17,000	.....
Waterway P. Prod. Co.	14,000	.....
West End Paper Co.	13,000	.....
Wisconsin River Paper & Pulp Co.	25,000	.....
TOTAL	1,739,000	839,000

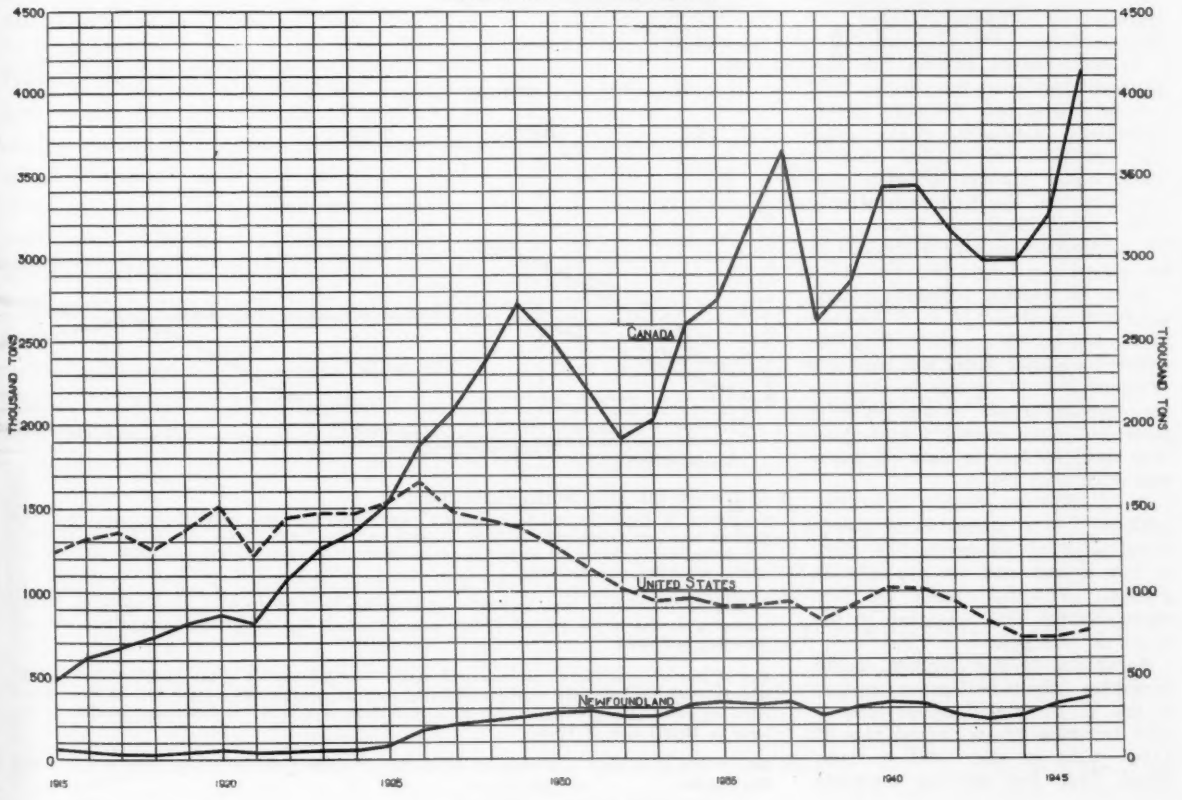
Decline of U. S. Newsprint

State	No. of mills in 1913	No. of such mills not now existing	No. of such mills making Newsprint in 1946	No. of such mills making only other grades in 1946
Cal.	1	0	0	1
Conn.	1	1	0	0
Me.	11	4	4	3
Mass.	1	1	0	0
Mich.	4	2	0	2
Minn.	4	0	0	4
N. H.	1	0	0	1
N. Y.	27	17	0	10
Ohio	1	1	0	0
Ore.	2	0	2	0
Pa.	2	2	0	0
Vt.	2	2	0	0
Va.	1	0	0	1
Wash.	1	1	0	0
Wis.	11	1	0	10
TOTAL	70	32	6	32

NOTE: Of five newsprint mills built in the U. S. since 1913, three now make newsprint and other grades, and two other grades exclusively.

NEWS PRINT PRODUCTION

UNITED STATES—CANADA—NEWFOUNDLAND





GREATER DEMANDS FOR RESIN-PAPER AND PURIFIED PULP FOR MANY NEW PRODUCTS

Tonnage-wise, the plastics field may be a comparatively small user of paper and pulp but it is a critical one. The types of high quality pulp and the quantities that go into certain plastics have a most important effect on the present very tight pulp market. It reduces substantially amounts of pulp available for paper. On the other side of the picture, there is a very important and interesting field in plastics for wood waste and lower grades of pulps which will help this industry to more completely utilize its natural resources.

A large number of pulp and paper companies are actively interested in the growing field of plastics and resin-treated products as either by-products or principal products of their operations.

As we pointed out in this department last year, the plastics field is difficult to define. Actually, rayon, cellophane, lacquers, photographic film, products of alcohol (sulfite waste liquor alcohol is being produced by two North American pulp mills in Bellingham, Wash., and Thorold, Ont.) may be embraced in the magic word—plastics.

Data on certain cellulose plastic products are shown in U. S. Bureau of Census tables accompanying this article on a later page. But the government has no figures to offer us on paper laminates, molds, plywood pulp and paper overlays, and other new and interesting uses of paper and pulp with resins.

A. J. Norton, closely identified with the latter categories of plastic manufacturers, however, has come to our rescue and we are able to present estimates made by him especially for this magazine in the chart on this page.

According to Mr. Norton, paper laminates (about half paper) output in the U. S. totaled 38,000 tons in 1946 but rose to an annual rate of 43,000 tons in the final quarter. Wood flour for molding purposes rose sharply again to 30,000 tons last year, he estimates, while pulp molds rose slowly but steadily.

Demand for Purified Pulps

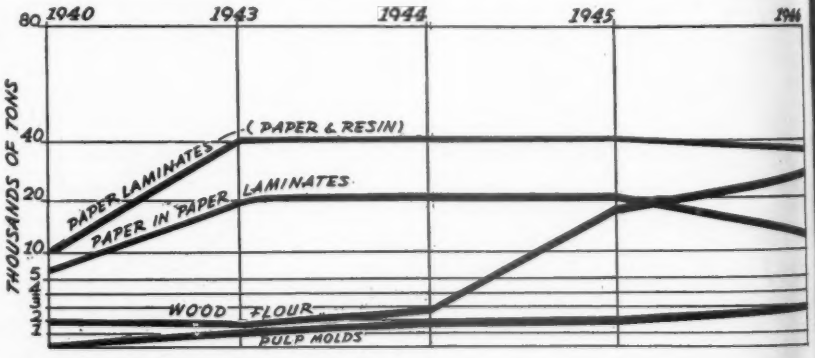
The non-paper (rayon, plastics, etc.) demand for high alpha pulps in the United States has been estimated by Charles W. Boyce of the Department of Commerce as follows:

1946	500,000 tons
1947	750,000 tons
1948	1,000,000 tons

Those 1947-8 figures are based on the extent to which producers of those plastic or rayon products figure they can cut into competitive fields, said Mr. Boyce, and warned that in order to attain this goal they can be expected to buy or lease outputs of present producing mills.

Rex Vincent, technical consultant, Bulkley, Dunton Pulp Co., has made what seems to be a rather more detailed survey of the present and prospective uses of not only the dissolving pulps used in rayon, transparent film and plastics but pulps used for such other non-paper purposes as vulcanized fibers and sanitary napkins. These are all what he calls purified pulps—having alpha cellulose content above 90%. His figures on the non-paper demand for wood pulp is somewhat lower than those suggested by Mr. Boyce, but he, too, estimates substantial increases.

He pointed out that the pulp used for acetate rayon is used as filler for urea-formaldehyde resins and for impregnating papers, and pulp used for viscose rayon is also used for facial tissue. For these types of pulps, he quoted these U. S. Pulp Producers Assn. figures (page 145):



U. S. LAMINATES AND MOLDS PRODUCTION

According to estimates by A. J. Norton, consultant who has been closely associated with plastics and paper industries in New England and the Pacific Coast, the production of paper laminates has remained at about the same level since 1943—40,000 tons through 1945, declining to 38,000 tons for 1946.

Production of laminates was unsteady due to strikes until the fourth quarter when Mr. Norton estimated it rose to the rate of 43,000 tons per year. About half the tonnage is paper and the other half resin.

Use of phenolic molding compounds with wood flour filler made a big jump to about 19,000 tons in 1945, he said, due to a switch to general purpose molding from the war uses which required extra strength fillers such as cotton flock and cord. It took another considerable jump to 30,000 tons in 1946.

Pulp molds have risen gradually to 3,000 tons in 1946 from practically zero in 1940, said Mr. Norton.

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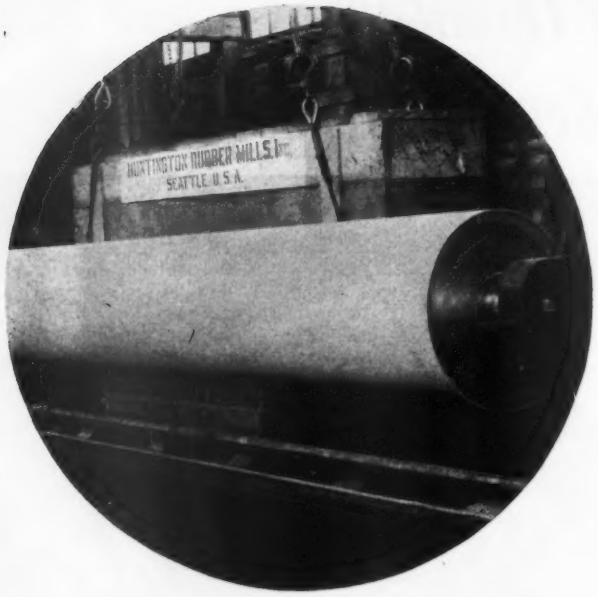
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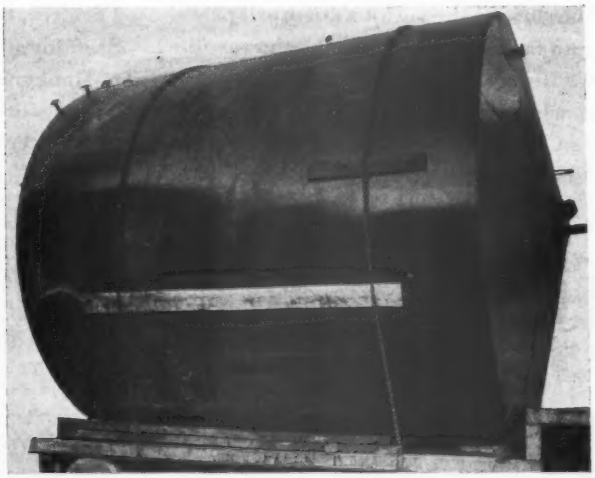
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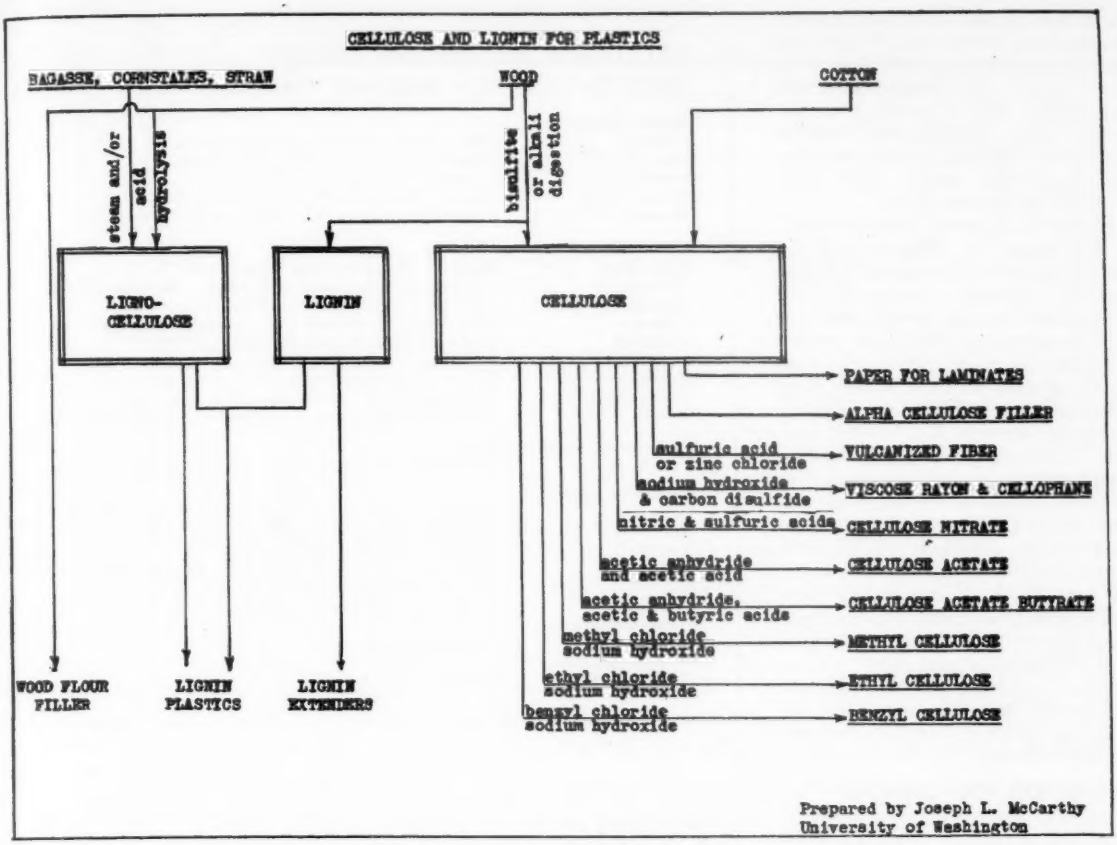
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THE ABOVE CHART WAS PREPARED ESPECIALLY FOR THIS MAGAZINE

U. S. AVAILABLE CONSUMPTION PURIFIED PULPS IN TONS

	1940	*1944*	*1946*
Production	288,500	429,545	295,680
Imports	113,945	132,675	198,540
Exports	115,204	10,729	9,300
Available	287,241	551,491	484,920

Canada has become a big supplier to U. S. converters of these purified pulps, all but 10% of the imports in 1946 coming from the Dominion. Six mills (three companies) in Canada will operate at the rate of 320,000 tons in 1947 as compared with 260,000 tons in 1946 and about 240,000 tons will be shipped to U. S. in 1947. (The new Celanese mill at Prince Rupert, B. C., will not yet be in production.)

In the U. S., seven mills (four companies) produced all the U. S. output in 1946. Mr. Vincent points out that the high record production and available consumption figures for 1944 is explained by the fact that the wartime smokeless powder or nitro-cellulose program was then at its heighth. Wood pulp fired most of the medium and large guns for the U. S. Army. Mills which made purified pulp for smokless powder now have partially gone back to paper pulps. But production in U. S. mills of purified pulps, Mr. Vincent said, may increase to 325,000 tons in 1947 and possibly 340,000 in 1948.

In addition to the above, the North American plastics and related industries have available an uncertain supply of purified pulps from Scandinavia. This amounted to 10,000 tons from Sweden in 1946 and Mr. Vincent said there is nothing to indicate anything different in 1947. Taking in all the factors previously mentioned, he estimates the amount of purified pulps available for North America in 1946 was 495,000 tons and that this will rise to 570,000 tons in 1947 and 590,000 tons in 1948.

Mr. Vincent points out these future available amounts are substantially below his calculations of demand—41,000 tons less in 1947 and 122,000 tons less in 1948. This shortage could be alleviated by Sweden this year, but certainly not to any appreciable extent in 1948. Therefore, he said, the pulp users will either postpone expansion plans or take steps to increase production of the specialized pulps they need. In certain fields, such as rayon, he said, sufficient pressure for products may cause the consumers to "see to it that mills are converted or built to satisfy" the demand.

His figures on demand (based on estimates from authorized sources or his own) follow:

NORTH AMERICAN DEMAND FOR PURIFIED PULPS

(*In Tons*)

	1947	*1948*
Rayon	350,000	405,000
Cellophane	85,000	100,000
Nitrocellulose	28,000	32,000
Other plastics	13,000	15,000
Miscellaneous	60,000	70,000
Exports	75,000	90,000
TOTAL	611,000	712,000

In the "Rayon" section of this North American Review Number, we discuss in detail the past, present and future status of that market for these pulps.

Mr. Vincent points out that transparent film, now generally known as cellophane, had consuming capacities of 40,000 tons in 1942 which rose to 56,400 tons by WPB figures in 1945 and was estimated by him as 70,000 tons in 1946. He sees it as continuing upward.

Nitrocellulose, oldest of the plas-

tic group, a base material for many things from movie film to lacquers and protective coatings, has three users today. Mr. Vincent said they use 25,000 tons of wood pulp annually now. Government statistics appearing with this article on nitrocellulose rods, sheets, and tubes indicate an upward trend.

Under the heading "other plastics," in his table, Mr. Vincent includes uses of wood cellulose for cellulose acetate, butyrate, propionate, the urea formaldehyde group and also such products as ethyl and methyl cellulose. In urea plastics, a high grade of pulp is used where high white or pastel shades are desired. But at the outside, Mr. Vincent said, only 7,500 tons of wood pulp will be used annually for urea plastics. Use of wood cellulose in acetates and other derivatives is small because of poor color obtained. Ethyl and methyl cellulose will use about 5,000 tons, he said, and a new product—carboxymethylcellulose — now using about 1,800 tons will reach 3,000 tons in 1948 probably.

In the miscellaneous uses of purified pulps, Mr. Vincent lists the following products (with estimates of pulp demand):

WOOD PULP DEMAND

	Tons
Facial tissue	18,000
Stereotype mats	1,500
Impregnating papers	15,000
Sanitary napkins	15,000
Vulcanized fiber	10,500
TOTAL	60,000

Facial tissue and impregnating papers can get along without purified pulp, and in some production they do, but if they got what they want, Mr. Vincent says the demand would easily be raised to 90,000 tons.

Actual finished products in the above classifications in the U. S., according to the U. S. Department of Commerce, has been as follows:

	1942	*1945*
Matrix	6,371	6,019
Vulc. Fiber	29,442	21,703
Impreg. Stock	8,540	31,017
San. Napkin Stock	37,610	41,467
Facial Tissue	89,194	80,333

In the export category of his table on total North American demand, Mr. Vincent figures principally upon exports from Canada to other countries outside the U. S., and he says U. S. exports will be small. Canadian exports may become larger because of a desire in the dominion to spread their markets. All in all, Mr. Vincent has made one of the most thorough-going surveys to date of the plastics and related fields for purified pulps.

CELLULOSE ESTERS AND ETHERS USED IN PLASTICS MOLDING INDUSTRY

Ethylcellulose	
Ethocel	**Dow Chemical Co., Midland, Mich.**
Dow 2.310	**Dow Chemical Co., Midland, Mich.**
Lumarith E. C.	**Celanese Corp., New York.**
Nixon E. C.	**Nixon Nitration Works, Nixon, N. J.**
Hercules E. C.	**Hercules Powder Co., Wilmington, Del.**
Cellulose acetate	
Bakelite	**Bakelite Corporation, New York, N. Y.**
Chemaco	**Chemaco Corporation, Berkeley Heights, N. J.**
Herculoid	**Hercules Powder Co., Wilmington, Del.**
Fibestos	**Monsanto Chemical Co., Springfield, Mass.**
Kodapak	**Eastman Kodak Inc., Rochester, N. Y.**
Lumarith	**Celanese Celluloid Corporation, New York**
Nixonite	**Nixon Nitration Works, Nixon, N. J.**
Plastacele	**E. I. du Pont de Nemours & Co., Inc.**
Tenite I	**Tennessee Eastman Corporation, Kingsport, Tenn.**
Cellulose acetate butyrate	
Tenite II	**Tennessee Eastman Corporation, Kingsport, Tenn.**
Cellulose nitrate	
Celluloid	**Celanese Celluloid Corporation, New York, N. Y.**
Hercules C. N.	**Hercules Powder Co., Wilmington, Del.**
Kodaloid	**Eastman Kodak Inc.**
Nitron	**Monsanto Chemical Co., Springfield, Mass.**
Nixonoid	**Nixon Nitration Works, Nixon, N. J.**
Pyralin	**E. I. du Pont de Nemours & Co., Inc.**
Methylcellulose	
Methocel	**Dow Chemical Co.**
Benzylcellulose	
Hercules B. C.	**Hercules Powder Co.**

Plywood Overlays

Under the heading of plastics uses for pulp and paper, we should not overlook the promising field of plywood pulp and paper overlays.

D. V. Redfern, chief chemist, Adhesives, Resins and Chemicals Division, American-Marietta Co., Seattle, Wash., pointed out to PULP & PAPER Industry that authorities in the plywood field anticipate up to 33,000 tons of low resin content board and paper will be used annually for plywood overlays.

"This program is just in the development stage," he pointed out, "and will not go into effect until the economics have been satisfactorily worked out. At present, costs are highly nebulous. One plywood company is using a low resin content pulp overlay. Otherwise, where overlays are presently used, it is a specialty market of high resin sheets."

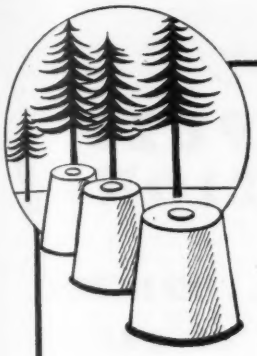
That the costs will be worked out seems assured, simply because the giant peeler logs used in plywood are becoming more scarce every year and some kind of an overlay surface is needed for inferior wood veneers. It has been demonstrated, furthermore, that a stronger, more attractive and more satisfactory plywood results from using pulp and paper resin-treated surfaces for the veneers than the old type of plywood without any overlay.

The important market of the future for overlays, to which Mr. Redfern referred, is one that is projected by the plywood industry itself and will call for paper and pulp overlays on about one billion square feet of plywood in the next three years. That is about 25% of the total anticipated plywood production and would require about 100,000 tons of paper and pulp for that three-year period.

Another type of overlay now in production, the so-called Welch process in which sawdust or groundwood with resin is pressed onto the veneer, was estimated to have used 150 tons of overlays in 1946 according to A. J. Norton, whose estimates for laminates, etc., have been mentioned.

"Low pressure laminating and the plywood overlay fields will increase the useage of pulp and paper in the plastics field even faster than pulp molding or conventional laminating," said Mr. Norton. "Material shortages are easing rapidly in the plastic materials and the 1947 production figures should level out on laminates, increase somewhat on molding powders but tend to level off and increase rapidly in overlays."

The Consolidated Water Power & Paper Co., St. Regis Paper Co., Weyerhaeuser Timber Co., Marathon Corp., Kimberly-Clark Corp., Howard Smith Mills of Canada, Keyes Fibre, Hawley Fibre Products and other companies are actively participating in plastics production.



IN THE PUBLIC INTEREST

Aided by consistent improvement in the wood cellulose which goes into its manufacture, rayon has greatly broadened its sphere of usefulness. Today there is hardly an individual who does not use rayon in everyday living, and this use is increasing daily.

Supplying a raw material so closely related to the public need imposes also a public responsibility. Rayonier, as the major producer of wood cellulose for the rayon industry, is alert to the challenge. Through extensive research, it seeks further improvement in existing wood cellulose, and also the development of new types for special purposes — often before a demand exists.

Prior to the war, for example, wood cellulose had not been used in making acetate rayon, although it had long been utilized for viscose rayon. In 1942 however, when the acetate rayon industry was faced with a shortage of raw material, Rayonier was ready with *Rayaceta* — a special wood cellulose for acetylation — which it had developed several years earlier.

The increased use of wood cellulose as the basic raw material for rayon, may be attributed in large measure to the steady improvements in quality — the development of special types in anticipation of a need — and the ability to custom-make this essential raw material for an industry which shows no signs of having reached the saturation point. In this manner, we are meeting our responsibilities "in the public interest."

RAYONIER
INCORPORATED

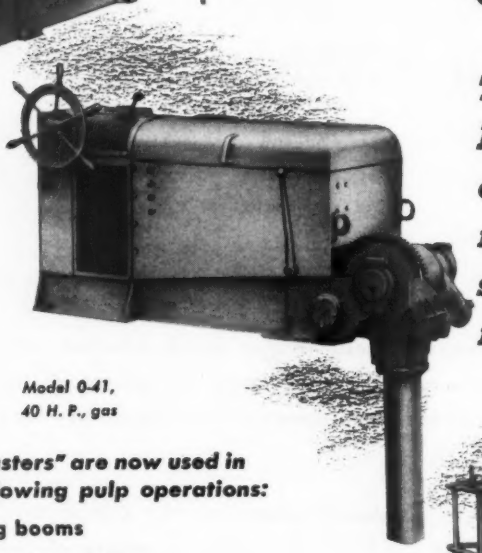
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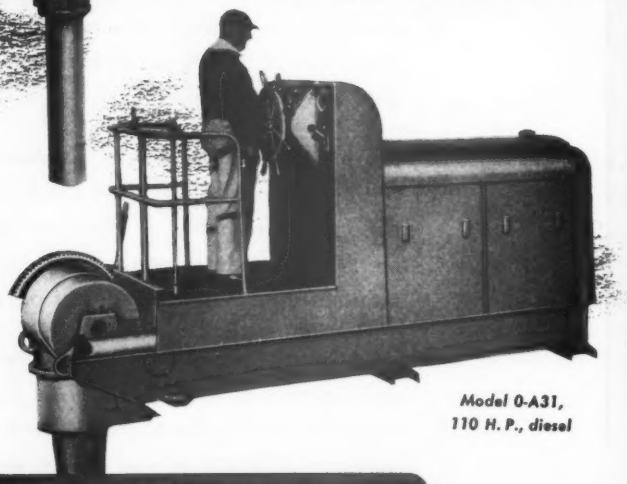
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"Harbormasters" are now used in the following pulp operations:

- **Towing booms**
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U. S. PLASTICS AND SYNTHETIC RESINS — SHIPMENTS AND CONSUMPTION — 1945-47

The figures shown represent the quantities shipped and quantities consumed in producing plants. Consumption in this case refers to the quantity of plastics and resins which are manufactured and used by the reporting company or company division, and the shipments data represent the quantities which are shipped by the reporting companies to outside users or to non-producing company divisions or subsidiaries. While the shipments and consumption data are called for separately on the report form, they are combined for the purposes of this report, since in most cases separate statistics on shipments and consumption cannot be shown without disclosing the operations of individual companies.

This table differs somewhat from previous data issued by the U. S. government, as shown in the 1942-1944 table below. But with certain combinations and, as qualified in footnotes, the statistics are approximately comparable with those released for previous years and months.

For example, figures on continuous sheeting (.003 gauge and upward) and "all other" sheets is comparable to the figures shown for cellulose acetate sheets, rods and tubes in reports below for 1942-1944, except that data for a small amount of rods and tubes were formerly included. Since the separate data reported for cellulose acetate rods and tubes cannot be shown without disclosing the operations of individual establishments, they are excluded from these figures.

The statistics for cellulose molding and extrusion material include data for cellulose acetate and cellulose acetate butyrate material. Previously, no data on the consumption for producing companies of molding and extrusion material were collected. Statistics for nitrocellulose products are entirely comparable with those previously issued.

(Totals shown in Pounds)

	1945			1946		1947	
Cellulose acetate and mixed ester plastics:[1]	*June*	*September*	*Year 1945*	*January*	*Year 1946*	*January*	*February*
Sheets:							
Continuous (under .003 gauge)	659,548	617,451	*4,103,541	591,872	7,649,795	816,954	663,254
Continuous (.003 gauge and upward)	372,583	377,785	9,788,567	524,883	7,498,529	636,257	479,890
All other sheets, rods and tubes	354,302	317,508		447,364	4,715,401	467,128	337,581
Molding and extrusion materials	5,151,393	5,344,463	61,123,062	6,689,778	83,204,045	7,656,594	7,081,388
Nitrocellulose plastics:							
Sheets	747,340	735,514	9,210,894	905,696	10,932,131	1,051,751	842,837
Rods and tubes	520,123	486,640	6,418,166	608,576	7,228,862	545,121	476,042
Other cellulose plastics[1, 6]			(6)		12,183,113	584,683	451,054
Phenolic and other tar acid resins:							
Laminating (dry basis)	3,558,660	1,717,022	*16,982,565	2,298,813	27,725,337	3,884,433	2,689,068
Adhesives (dry basis)	1,017,738	511,071	(3)	1,070,902	16,120,513	1,545,052	1,667,023
Molding materials[1]	11,387,736	9,949,599	*70,728,135	10,739,472	140,216,443	14,736,607	12,713,705
All other (dry basis)[2]	4,548,307	3,006,906	*22,936,272	4,415,637	58,201,169	6,814,636	6,345,969
Urea and melamine resins:							
Adhesives (dry basis)	2,970,291	2,227,825	*17,834,723	2,650,044	40,797,108	3,631,375	4,523,676
Textile and paper treating (dry basis)	547,061	734,133	(3)	1,071,084	13,534,368	1,510,363	1,352,485
All other (dry basis)[2]	322,757	153,828	*1,740,559	235,687	**3,746,580	882,654	781,351
Polystyrene	5,898,006	1,712,417	8,207,092	2,728,623	66,769,321	7,431,671	6,963,601
Vinyl resins:							
Sheeting and film[1]	1,355,902	1,185,090	13,713,264	1,569,044	52,079,495	6,196,557	5,131,196
Textile and paper coating (resin content)	2,122,082	1,366,602	8,426,502	1,650,026	11,673,212	1,237,297	892,431
Molding and extrusion materials[1]		2,216,090	24,809,268	5,496,024	61,852,162	6,801,822	5,344,800
Adhesives (resin content)	2,170,949	224,513	8,152,076	399,177	27,082,895	3,096,480	2,255,049
All other (resin content)[2]		665,568		325,491	27,082,895	3,096,480	2,255,049
Miscellaneous plastics and resins:							
Molding and extrusion materials[1, 8]	10,569,934	3,067,259	(6)	4,647,572	(6)	5,631,342	5,597,857
All other (dry basis)[2, 4]	3,553,389	2,614,375	17,651,384	2,630,148	35,689,921	2,558,976	2,049,852

Source—Chemicals Unit, Industry Division, U. S. Bureau of Census.
*7 months only.
**11 months only.
[1]Includes filler, plasticizers and extenders.
[2]Excludes data for protective coating resins.
[3]Includes data for ethyl cellulose, urea and melamine, acrylic acid and miscellaneous molding and extrusion materials.
[4]Includes petroleum resins, acrylic acid ester resins, mixtures and miscellaneous synthetic resin materials.
[5]Comparable data not available.
[6]Cannot be shown without disclosing the operations of individual establishments.

U. S. CELLULOSE PLASTIC PRODUCTS: PRODUCTION, AND SHIPMENTS AND CONSUMPTION 1942-1944

(In Pounds)

	NITROCELLULOSE								CELLULOSE ACETATE			
	Total		Sheets		Rods		Tubes		Sheets, rods, and tubes		Molding composition	
	Production	Shipments and consumption	Production	Shipments and consumption	Production	Shipments and consumption	Production	Shipments and consumption	Production	Shipments and consumption	Production	Shipments
1942	15,128,826	16,038,188	10,422,370	10,838,323	3,662,075	3,819,016	1,044,381	1,380,849	7,453,307	6,777,324	40,792,518	38,794,514
1943	14,042,348	14,530,299	8,929,257	9,323,639	4,280,853	4,409,707	832,238	796,953	10,163,467	10,082,236	44,222,714	42,214,571
1944												
January	1,275,119	1,209,993	791,671	770,263	409,823	377,964	73,625	61,766	798,925	838,260	4,040,660	3,705,769
February	1,443,101	1,318,505	920,565	793,903	450,050	472,650	72,486	51,952	721,952	868,261	4,213,788	4,019,165
March	1,468,320	1,479,146	931,996	917,165	459,720	480,003	76,604	81,978	646.137	822,248	4,482,339	3,878,183
April	1,474,637	1,511,507	947,496	951,989	431,395	467,117	95,746	92,401	676,416	622,199	4,878,333	4,544,239
May	1,456,855	1,469,530	882,587	897,395	484,628	483,626	89,640	88,509	762,307	842,301	5,204,868	4,672,882
June	1,468,681	1,561,850	907,405	943,928	448,191	505,433	113,085	112,489	704,136	757,546	4,860,128	4,528,425
July	1,198,118	1,291,518	726,664	774,303	381,927	419,223	89,527	97,992	736,111	675,785	4,517,606	4,207,545
August	1,382,746	1,319,348	894,642	820,133	396,356	410,655	91,748	88,560	730,922	731,818	5,007,831	4,504,670
*8 mo. 1944	11,167,577	11,161,397	7,003,026	6,869.079	3,462,090	3,616,671	702,461	675,647	5,776,906	6,158,418	37,205,553	34,060,878

*Released as of March 2, 1945. For reasons of national security figures for late 1944 months and recent months were withheld.
Source: Bureau of Census.

CELLULOSE PLASTIC PRODUCTS— 1942-44

Data above are based on reports of 15 manufacturers which represent practically the entire industry. Nine manufacturers make cellulose nitrate products, six make cellulose acetate products and ten make cellulose acetate molding composition. Beginning October, 1943, data are included for two companies which produce cellulose acetate molding composition from scrap material. While these companies were in operation prior to October, 1943, comparability of the data is little affected; in that month, they made no shipments and accounted for only 2 per cent of total molding composition production. One additional company reported cellulose acetate sheets, rods and tubes for the first time in November, 1943. The production of this company is so small that comparability is unaffected.

The production, and shipments and consumption figures represent data reported by prime manufacturers of cellulose plastic material and include no data for plastic molding which manufacture products from purchased material. This results in some understatement of the data for cellulose acetate sheets, rods and tubes. Manufacture of these products from purchased material, however, is reflected in the data here shown for shipments of cellulose acetate molding composition. The statistics shown for sheet forms do not contain data for safety glass sheeting. They may, however, contain data for some wrapping material, since the report form does not specify that such should be excluded.



DEMAND for WOOD PULP SHOOTS SKYWARD, SHATTERING ALL PAST RECORDS

THE world production of rayon headed upward again in 1946 but was still substantially behind the 1941-1943 record period, due to subnormal conditions continuing abroad. But the North American industry surged to new heights.

The 16 companies which control the U. S. rayon industry had a vigorous year in 1946—a peak of 854,000,000 pounds, almost eight per cent higher than in 1945 and more than double that of 1939. For 1948 the industry predicts an additional 26%, and of 1.5 billion pounds by 1956.

U. S. consumption of 875 million, the latter figure being more than 100 million pounds more than was ever recorded before. This figure is the sum producers' domestic shipments and imports for consumption. Canada, with successive record years in 1944 and 1945, presumably hit new highs in 1946, too.

U. S. PRICES OF DISSOLVING WOOD PULP

Prices are per 2,000 pounds, air dry basis (10% moisture content), freight equalized for gross weight on respective Atlantic Seaboard or Gulf ports.

	For Regular Viscose	*For High Tenacity Viscose*	*For Acetate & Cupra Rayon*
May 1938	$ 85		
Feb. 1939	75		
Apr. 1940	80		$100
Jul. 1940	85	$100	100
Jul. 1943	85	100	110
Apr. 1944	95	100	110
Jan. 1946	107½	112½	117½
Nov. 1946	122	127½	138½
Feb. 1947	139	147	158

Individual company records were as healthy, Dr. Camille Dreyfus, chairman of the board of Celanese Corp. of America, which is going to build its own pulp mill, could have been speaking for almost any company, instead of just his own, when he let go of a masterpiece of understatement: "Demand for the product is considerably in excess of the supply." Less than 35 years ago, rayon was a stepchild. Today, two-thirds of all dresses worn by U. S. women are rayon.

Such growth, actual and projected, is having the effect on the pulp industry, as described in detail in this NORTH AMERICAN REVIEW NUMBER.

But research is a constant in the rayon business and recently *Textile Week* said: "No one can say that cellulosic fibers are head and sholders above others. Right now we are producing fibers from soybeans, chicken feathers, egg albumen, and many other products . . . No one can say when—maybe ten, 50 or 100 years from now—but there is little doubt that one day all fibers will be synthetic. There will be no natural fibers."

Meanwhile, apparently the wood pulp industry of this continent will be able to supply at least three-

CELLULOSE CONSUMPTION BY THE U. S. RAYON INDUSTRY

Short Tons of Refined Cellulose

	TOTAL PULP		WOOD PULP*		LINTERS PULP*		RAW COTTON LINTERS†
	Tons	Per Cent	Tons	Per Cent	Tons	Per Cent	Bales
1930	72,000	100	45,000	62	27,000	38	115,000
1931	84,000	100	53,000	63	31,000	37	132,000
1932	74,000	100	43,000	58	31,000	42	132,000
1933	115,000	100	65,000	57	50,000	43	213,000
1934	112,000	100	63,000	56	49,000	44	209,000
1935	137,000	100	86,000	63	51,000	37	218,000
1936	151,000	100	104,000	69	47,000	31	201,000
1937	176,000	100	132,000	75	45,000	25	187,000
1938	147,500	100	110,000	75	40,000	25	160,000
1939	194,500	100	145,000	75	53,000	25	211,000
1940	238,000	100	178,000	75	60,000	25	256,000
1941	287,500	100	214,500	75	73,000	25	312,000
1942	330,000	100	280,500	85	49,500	15	211,000
1943	336,500	100	281,000	84	55,500	16	237,000
1944	367,000	100	285,000	78	82,000	22	350,000
1945	400,000	100	297,000	74	103,000	26	438,000
1946	426,000	100	321,000	75	105,000	25	447,000

*Wood and linters in purified form as used by rayon producers.

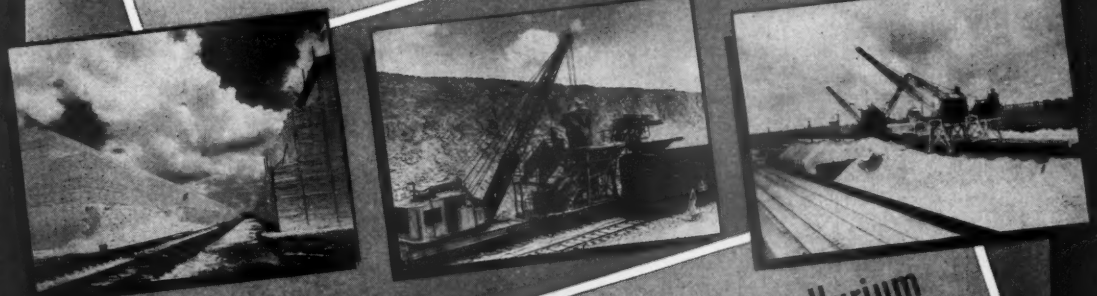
†Bales of raw cotton linters figured on the basis of one-third overweight on refined linters pulp (due to refining losses) and converted to bales on the basis of 625 pounds net weight per bale.

Source: Rayon Organon, April, 1945.

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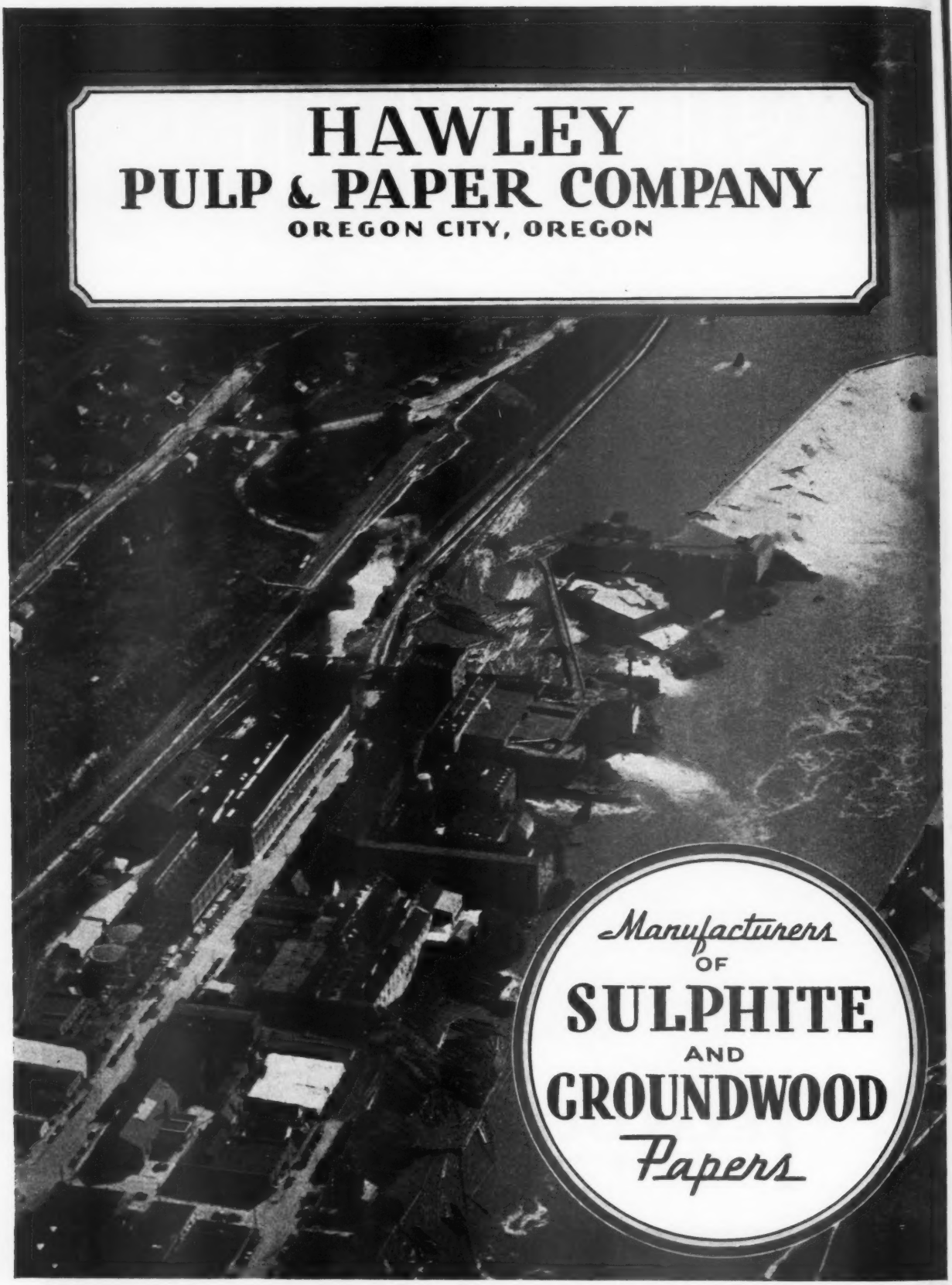


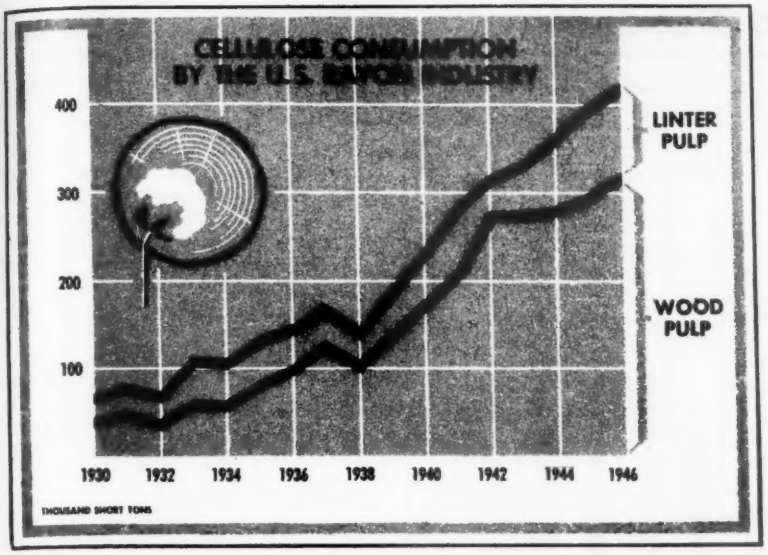
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This drawing from RAYON ORGANON shows that three-fourths of pulp used in rayon is from trees. Note the big increase in wood pulp use. In 1946 three times as much wood pulp was used as cotton linters.

fourths of the fiber which will be needed by the fourth quarter of 1948, when, according to Rayon Organon, the U. S. rayon industry's capacity on annual basis will have reached 1,200,000,000 lbs., as against a present operating capacity of 891,000,000. It is due to pass the billion pound mark by the end of 1947, according to a survey by that publication, which is issued by the Textile Economics Bureau, Inc., 10 East 40th, New York 16.

Charles Boyce, prominent analyst in the paper industry has predicted that the rayon industry will buy wood pulp mills or lease output to attain its ends. There are very few areas where it could build new mills with sufficient timber behind them, as Celanese is doing near Prince Rupert, B. C.

Wood Pulp Favored

Of greatest interest and most importance to the pulp and paper industry (the paper industry because it sees where some of its former supplies of pulp are going) is the amount of wood pulp being consumed as the raw material for rayon manufacturing.

In the United States in 1946, there were 321,000 tons of purified wood pulp used by the rayon industry. Never before in rayon's 36-year history was so much wood pulp used. The 1946 record was 24,000 tons more than in 1945; more than twice as much as in 1939; three times as much as in 1936 and more than six times as much as in the early 30's.

As to the use of wood pulp versus cotton linters as base for added capacity, Rayon Organon predicts that annual tonnage use of wood pulp had already risen to 339,000 tons by Nov. 1946 (as compared with 321,000 actual production for that year) and that it would continue to rise to 426,000 tons by Oct. 1948.

From Rayon Organon's survey, Rex Vincent, Technical Consultant, Bulkley, Dunton Pulp Co., presented this table:

Date	*Tonnage Capacity*	*Tons Wood Pulp Required*
Nov. 1946	445,500	339,000
July 1947	482,500	367,200
Mar. 1948	521,500	396,800
Oct. 1948	560,000	426,000

"The organizations spending money to develop the expansions must have some idea of the growth of the demand for yarn and certainly will attempt to operate that capacity if at all possible," said Mr. Vincent. "It is very doubtful if there will be sufficient pulp and other chemicals to permit it to operate even if the demand for the yarn were present, but if there is sufficient pressure for that type of pulp, somebody will see to it that mills are converted or built to satisfy it."

Big Foreign Market

"In addition to the domestic demand for wood cellulose pulps, there exists a large unsatisfied market in foreign markets," Edward Bartsch, president of Rayonier Incorporated, told his stockholders early this year.

Except, perhaps, for certain specialized uses, wood pulp has won its spurs in the rayon field and is now assured of long-term favor over cotton linters, which is its "rival" as the raw material for rayon. Each year wood pulp crowds out linters more and more. It has the advantages of uniformity of quality, price and far more wood pulp cellulose can be produced on a given acre.

In the viscose and cuprammonium field, the great bulk of regular tenacity yarn and staple fiber is made from wood pulp. In high tenacity viscose yarns, the useage of wood pulp and linters varies, with one

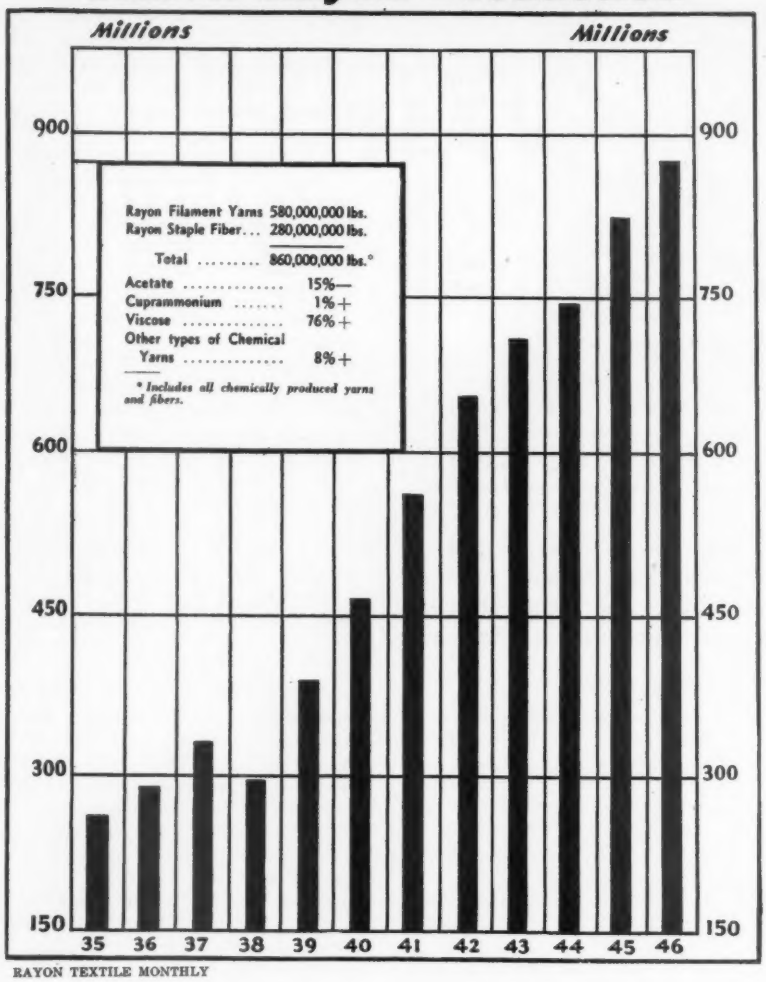
ANNUAL FIBER CONSUMPTION IN THE UNITED STATES

(Units are Millions of Pounds and Percent)

	COTTON		WOOL		RAYON		SILK		TOTAL	
	Pounds	%	Pounds	%	Pounds	%	Pounds	%	Pounds	%
1920	2,828.1	88.9	314.2	9.9	8.7	0.3	29.2	0.9	3,180.2	100
1930	2,610.9	85.0	263.2	8.6	118.8	3.9	75.7	2.5	3,068.6	100
1935	2,754.7	78.9	417.5	11.9	259.0	7.4	62.3	1.8	3,493.5	100
1940	3,953.6	81.0	411.1	8.4	482.0	9.9	35.8	0.7	4,882.5	100
1943	5,258.3	80.4	628.0	9.6	656.2	10.0	nominal		6,542.5	100
1944	4,787.5	78.3	623.9	10.2	704.8	11.5	nominal		6,116.2	100
1945	4,508.2	76.1	648.2	10.9	767.5	13.0	nominal		5,923.9	100
1946	4,844.9	74.8	748.4	11.6	875.4	13.5	6.3	0.1	6,475.0	100

Source: Rayon Organon.

U. S. A. Rayon Production



RAYON TEXTILE MONTHLY

United States Rayon Production in Millions of Pounds

	1946	1945	1944	1943	1942	1941	1939	1930
Filament Yarn	677.5	624.1	555.2	501.1	479.3	451.2	328.6	127.3
Staple Fiber	176.4	168.0	168.7	162.0	153.3	122.0	51.3	0.4
TOTALS	853.9	792.1	723.9	663.1	632.6	573.2	379.9	127.7

United States Rayon Consumption in Millions of Pounds

	1946	1945	1944	1943	1942	1941	1939	1930
Filament Yarn	666.5	602.4	539.0	494.2	468.8	452.4	362	118
Staple Fiber	208.3	164.9	165.7	162.0	151.8	133.6	96.5	1
TOTALS	874.8	767.3	704.7	656.2	620.6	586	458.5	119

CANADIAN RAYON PRODUCTION AND IMPORTATIONS

(1925 to 1945—In Pounds)

	Yarn Production	*Yarn Imports*	*Staple Fiber Imports*	*Total Consumption*
1925	507,528	1,851,402	.....	2,359,030
1930	4,627,327	2,383,794	.....	7,011,121
1935	13,215,617	1,214,656	.....	14,430,273
1940	19,637,869	3,482,255	4,180,609	25,574,864
1944	19,225,000	6,969,141	6,975,803	33,169,945
1945	21,100,000	7,584,477	6,841,301	35,525,748

Does not include imports of military tire yarns.

plant, Industrial Rayon Corp. of Cleveland, using wood pulp entirely. That company is going to build one of three new projected viscose rayon plants for the industry, while Celanese plans a new acetate rayon plant at Rock Hill, S. C. High tenacity viscose has supplied the heavy duty tire cord for planes and trucks and literally saved the war and victory because it made synthetic rubber work. Rayon cord demonstrated superiority in every way over cotton cord. "Rayocord" was a wood pulp product of Fernandina, Fla., mill of Rayonier.

But today it is in the field of acetate rayon where wood pulp has made most remarkable advances over recent years, although its use declined slightly in relationship to linters for that type of rayon. Wood pulp was 63% of the total after a high of 69% in 1945. Rayon Organon forecasts tripling of acetate staple rayon capacity from 42 million pounds now to 123 million by the fall of 1948. A 27% increase in viscose staple capacity from 139 million to 177 is indicated. High tenacity viscose yarn will increase only 5% by late 1948, already being at a high capacity of 250 million pounds. Its production had increased 12% over 1945 in the year 1946.

According to data of the U. S. Pulp Producers Association, the available supply of dissolving pulp in this country was slightly over 490,000 tons (domestic production plus imports less exports). Thus it will be seen that the rayon industry took about two-thirds of this available supply; the remaining quantity was consumed in, or was available for, manufacture of such products as cellophane, plastics, etc.

According to the Bureau of the Census, the production of raw cotton linters for the crop year ending July 31, 1946 was 989,000 running bales. This figure compares with a crop of 1,251,000 bales during the season ending July 31, 1945. On the basis of the 1945-46 crop, the rayon industry's consumption of raw linters at about 447,000 bales ostensibly took one-half of that crop. Refined cotton linters also are used in the manufacture of plastics, lacquers, explosives, paper and similar products. Among the uses of raw cotton linters are upholstery, mattress and toy stuffing.

B. M. May, manager, rayon department, E. I. DuPont de Nemours & Co., says: "After 35 years of phenominal growth, the most significant aspect of the rayon industry today is that this growth is accelerating and not slowing down. Volume of man-made textiles, which



heads are better than 1

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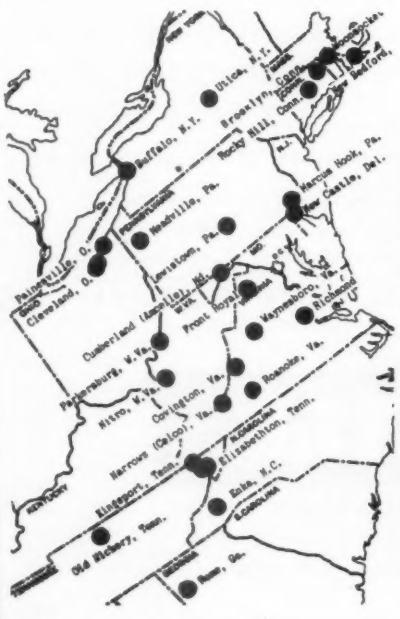
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WORLD RAYON PRODUCTION
Thousands of Pounds

	Filament Yarn	Staple Fiber	Total Rayon
1890	30	*	30
1900	2,200	*	2,200
1905	11,100	*	11,100
1910	17,600	*	17,600
1911	18,700	*	18,700
1912	19,800	*	19,800
1913	25,195	*	25,195
1914	19,700	*	19,700
1915	18,500	*	18,500
1916	23,400	*	23,400
1917	24,200	*	24,200
1918	25,900	*	25,900
1919	27,800	*	27,800
1920	33,100	*	33,100
1921	48,200	*	48,200
1922	76,590	*	76,590
1923	102,990	*	102,990
1924	138,285	*	138,285
1925	185,290	*	185,290
1926	211,735	*	211,735
1927	295,095	*	295,095
1928	360,550	*	360,550
1929	434,215	7,185	441,400
1930	451,200	6,250	457,450
1931	499,665	7,980	507,645
1932	517,300	17,285	534,585
1933	663,395	27,895	691,290
1934	772,525	51,835	824,360
1935	941,055	139,575	1,080,630
1936	1,023,305	298,595	1,321,900
1937	1,203,105	620,955	1,824,060
1938	991,475	959,735	1,951,210
1939	1,150,425	1,149,440	2,299,865
1940	1,183,760	1,279,700	2,463,460
1941	1,267,025	1,492,080	2,759,105
1942	1,213,170	1,536,985	2,750,155
1943	1,165,885	1,467,350	2,633,325
1944	1,039,630	1,116,910	2,156,540
1945	934,000	596,000	1,530,000
1946	1,100,000	700,000	1,800,000

Courtesy: Rayon Oreganon.



LOCATIONS OF RAYON PLANTS IN U. S.

Companies, locations and processes:

American Bemberg Corp., Elizabeth, Tenn. (cuprammonium); American Enka Corp., Enka, N. C. (viscose); American Viscose Corp., Front Royal, Va., Lewiston, Pa., Marcus Hook, Pa., Nitro, W. Va., Parkersburg, W. Va., and Roanoke, Va. (viscose), and Meadville, Pa. (acetate); Celanese Corp. of America, Cumberland, Md., and Narrows, Va. (acetate); Delaware Rayon Co., New Castle, Del. (viscose); E. I. du Pont de Nemours & Co., Buffalo, N. Y., Old Hickory, Tenn., and Richmond, Va. (viscose), and Waynesboro, Va. (acetate); Hartford Rayon Corp., Rocky Hill, Conn. (viscose); Industrial Rayon Corp., Cleveland, Painesville, O., and Covington, Va. (viscose); Manville Jenckes Corp., Woonsocket, R. I. (viscose); National Rayon Corp., Cleveland (viscose); New Bedford Rayon Co., New Bedford, Mass. (viscose); North American Rayon Corp., Elizabethton, Tenn. (viscose); Skenandoa Rayon Corp., Utica, N. Y. (viscose); Tennessee Eastman Corp., Kingsport, Tenn. (acetate); Tubize Rayon Corp., Rome, Ga. (viscose and acetate), and U. S. Rayon Corp., Brooklyn, Conn. (cuprammonium).

annually has been at new and sharply higher levels, has an expanded capacity already in sight that will dwarf the pre-war levels of production. More than 1,000,000,000 pounds of man-made fibers will be produced annually in this country by 1950.

"Behind this rapidly growing supply, which still has not matched the demand, is the ever growing research activity of the industry designed to produce better products for specific textile purposes. The cumulative effects of these years of research and experimentation, combined with the greater current expenditures as the industry grows, provides the much broader front on which man-made fibers are now advancing.

"Since novelty and new effects are much sought for in the textile trades, these consuming industries have been very receptive to the new contributions made by the man-made textiles. Therefore these consumers have been quick to discover better textile products as they made their appearance and quick to seek large production of those new textiles that the research man has developed to do a textile job better.

"Rayon tire yarn is illustrative of the speed of public acceptance of a better fiber. This product, which had been introduced to the trade shortly before the war, was quickly appreciated by the military forces and became the largest selling type of rayon fiber in a very short time. The commercial interest of the textile industry is not far behind this military interest and today the rayon industry is far short of supplying the tire yarn now required for peace-time purposes."

More information on the rayon situation is given by Hayden B. Kline, executive vice president of Industrial Rayon Corp., exclusive users of wood pulp: "The year 1946 witnessed an important development for the viscose rayon industry. It was during this year that the tire industry publicly acknowledged, through its advertising, its categorical approval of viscose rayon not only for the building of truck tire but for passenger tires as well. It thus becomes evident that high-tenacity rayon has succeeded in attaining recognition of its superior strength, uniformity and resistance to heat in the manufacture of better tires.

"Despite conversion of an impressive share of rayon production to tire cord, the supply lacked meeting the demand. Trade estimates indicate that the present productive capacity can meet only about two-thirds of tire manufacturers' needs."

YOU CAN'T THINK of RAYON Without THINKING of SULPHUR



Seldom does the nation view a "success story" comparable to the amazing development of rayon. In a few short years the popularity and versatility of rayon has increased until it has become one of the most widely used fabrics.

In the rayon industry, Sulphur is called into active duty at each successive stage. First, it is the principal agent in the preparation of wood pulp. Then, as carbon bisulphide, it acts to solubilize the pulp. After this, as an acid bath, it fixes the threads. Finally, as acid, it helps make the dyes which give rayon its rainbow of colors.

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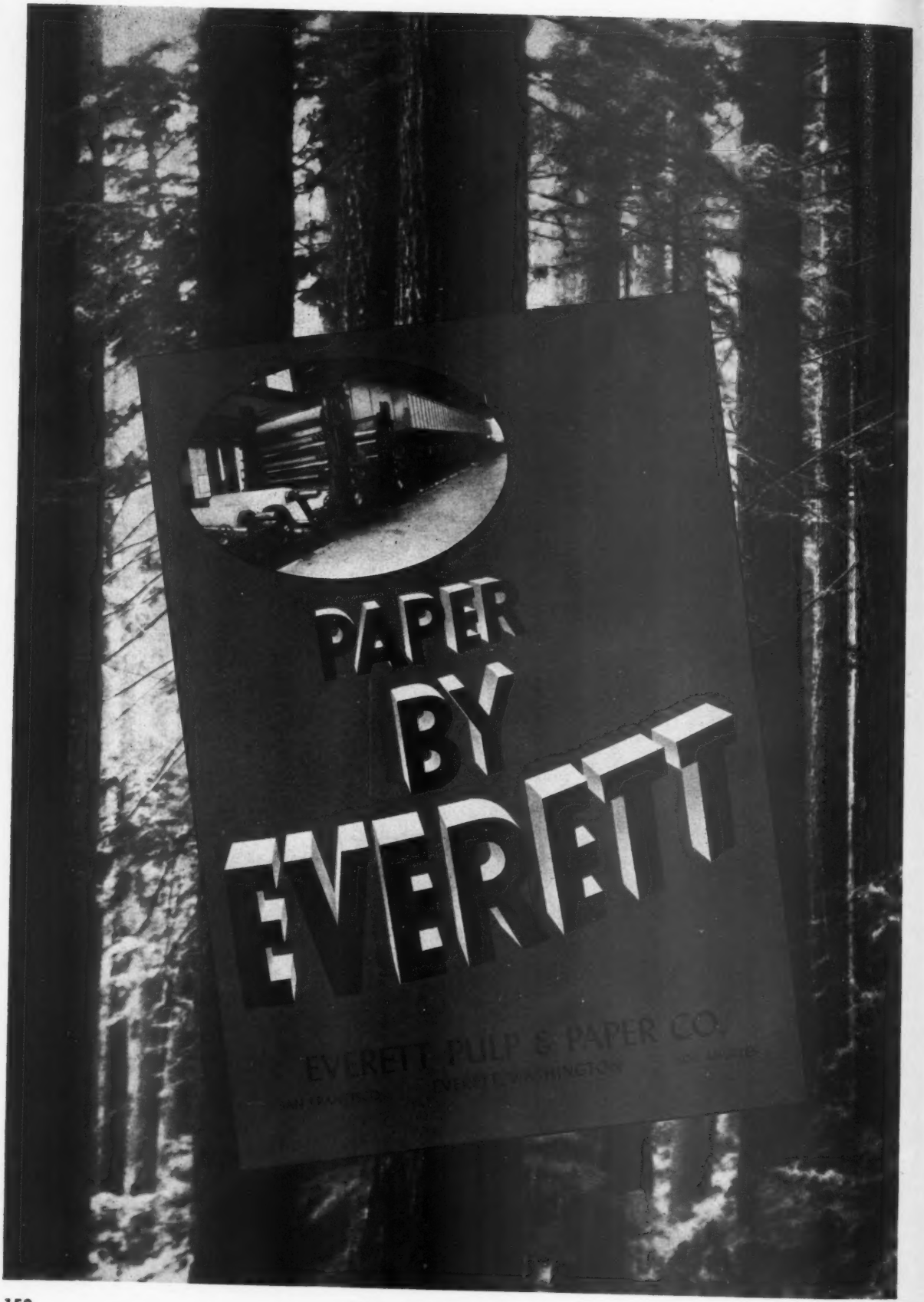
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PAPER
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ENGINEERING ADVANCEMENT

—(Continued from Page 58)

At the Thilmany mill in Kaukauna, Wis., when visited by PULP & PAPER, a Towmotor lift truck was being ingenuously used. It lifted four rolls of butcher paper or waterproofing and deposited them on a small auto truck at a mill siding. By simply snapping a chain over them, the rolls were made safely in place and then were moved quickly to the finishing room. One man doing the job was back in 15 minutes for a second load.

Grover Keeth, Marathon's chief engineer, said that his company has recently installed a number of gasoline trucks and equipped an electric truck with gas driven generator in place of battery and thereby speeded up handling.

Hammermill's Truck System

Acting upon findings of its engineers, Hammermill Paper Co., of Erie, Pa., set up a separate department to coordinate and centralize material handling all through the mills. A. J. Aubin, formerly of the engineering department, was named superintendent of the new material handling and transportation department.

This freed other superintendents of responsibility; a fleet of 24 storage - battery - powered industrial trucks in operation by the end of 1946, with more coming, provided increased service; safety hazards were reduced; more material was handled with the same equipment; costs were reduced; equipment was kept in better condition. Pallet-and-fork truck system was generally adopted. The pulp laps were handled with scrap lumber supporting frames or sleeves in which forks could fit and the frames were left under loads in boxcars. Where it formerly required 20 man hours to load lap in a car, it is now done in three hours by one truck operator. Many other truck savings like this are well known.

Flintkote's News Storage

A new type of news storage celler at Pioneer-Flintkote's mill in Los Angeles is interesting. In the floor is a 42-in. wide slot running its entire 72-ft. length and under the slot is a conveyor belt in a roomy subfloor tunnel, where repairs can easily be done. Up under the ceiling of the basement along the greater part of a wall are hatches. Trucks dump loads of waste newspaper through these hatches . . .



Pioneer-Flintkote's waste paper storage basement. Through open hatches at upper right, trucks dump news waste in bundles or loose. It is raked from any part of room into slots shown on floor (man bending over slot) where conveyor in roomy tunnel takes waste to another conveyor to Hydrapulper.

Waste is then pulled by forks into the slot to the conveyor and this conveyor carries waste from any part of the basement to a connecting conveyor to a new Hydrapulper.

WOOD PREPARATION

In the wood preparation plants of the pulp industry there is one engineering advancement that stands head and shoulders over all others —that is hydraulic barking coupled with whole log chipping.

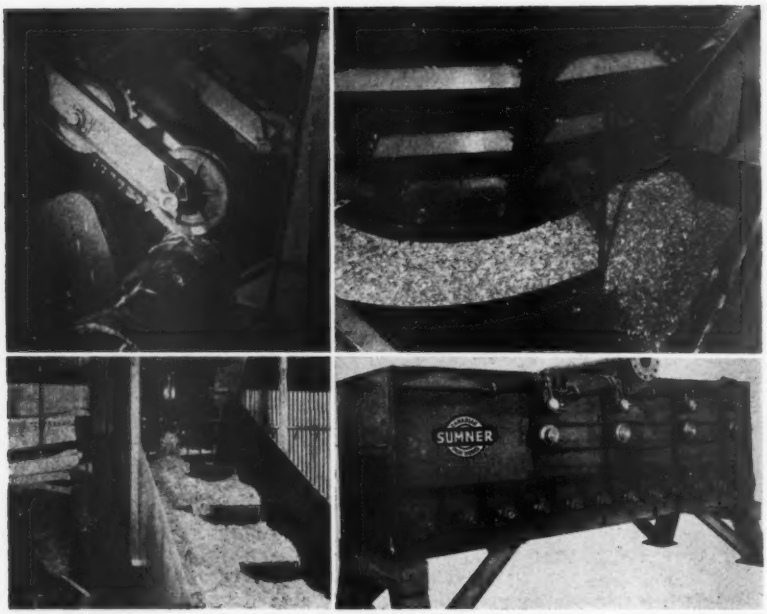
Many engineers will say without a moment's hesitation that these new plants with this equipment provide the greatest advancement in engineering the industry has seen in modern times. It might be comparable in importance to the invention of the Fourdrinier itself or some cooking process. The significance, of course, is in the tremendous wood savings achieved in the timber areas of the Pacific Coast. Although quite a number of small hydraulic barkers have been installed in the east, the chief engineer of one of the biggest paper companies, with several mills under his charge, told PULP & PAPER Industry that even though his company has installed a hydraulic barker, it has not yet demonstrated superiority over mechanical barking in their part of the country. The point is this—the big wood savings of up to 20% are possible only in the big timber country of the west, where mechanical barking had required cutting a tree up into 20 or 30 cants and slabs before it could be barked.

This saving of one tree out of every five in making a given amount of pulp, plus the salvaging of broken and small wood formerly wasted, use of slabs formerly burned and discovery of ways to use Douglas fir have combined to assure perpetuity of many pulpwood operations on the Pacific Coast.

Readers of PULP & PAPER Industry are familiar with the types of hydraulic barkers developed, as this magazine has reported in detail each new installation. The trend seems to be toward simplication and greater versatility of the machines. The first types were the Weyerhaeuser barker with a chain turning the log with an indexing operation and high pressure nozzle on a carriage cutting off the bark from underneath and the so-called "lathe" type in which the log is lifted by steel arms to a lathe-like mechanism while a nozzle carriage runs lengthwise overhead while the log is being spun. This Crown Zellerbach type was first installed in Port Townsend and later in Rayonier mills and Hawley Pulp & Paper Co.

Soundview Pulp Co., producing up to 600 tons of pulp a day and normally using the 200,000 bd. ft. of logs annually or the equivalent of over 400,000 cords, wanted faster and greater production and also had larger and much heavier logs to handle than average. Thus came the adjustable ring type barker, with big logs going through the machine, butt to butt, up to 60-in. diameter and 32 feet long and being barked in a matter of seconds. It has two adjustable and one fixed 120-degree segment assembles with a total of 36 nozzles. The movable segments are brought closer to small logs and only a portion of the nozzles are used. Experimental work with fixed ring-type barkers has been carried out.

The next step is what might be called a "cradle" type of barker, also a big producer and with heavy rolls able to carry logs up to one and one-half tons in weight, but with a very simplified process wherein there is continuous flow of operation and the log is turned in a cradle of toothed wheels with nozzle possing above. Meanwhile the Weyerhaeuser barker has been improved, with continuous, speedier log turning, a



WOOD HANDLING AND WOOD PREPARATION have brought forth the greatest and most sensational engineering developments in the Far West. Here are some illustrations:
Upper left: The Weyerhaeuser type of whole log hydraulic barker with log turned by a chain as nozzle with 1200 to 1400 lbs. pressure per sq. in. of water chiseling off the bark from underneath. There are several types of big barkers—the "lathe" type and "cradle" type and fixed and adjustable "ring" types being others now in use. The biggest chippers in the world reduce the whole logs, and these operations save 20% of Pacific Coast wood formerly lost in barked slivers, saw kerf, etc.

Lower left: A chip chain designed to carry twice the usual load in same space with same power at Soundview Pulp Co. The chain leads from a big chipper (the chipper "eats" up whole logs up to 34 inches in diameter in a few seconds). The chain carries six units of chips per minute, helped by the flights designed by Electric Steel Foundry Co.
Upper right: Puget Sound Pulp & Timber Co., Bellingham, Wash., introduced this new and interesting type of chip feeder. It is a suspended chip hopper with revolving plate feeder. It is at the bottom of a huge chip storage silo and from the revolving bin, the chips are fed onto a belt conveyor. There have been somewhat similar arrangements in Eastern mills but this is the first for unscreened chips. The conical shape at the bottom of the chip hopper is shown.

Lower right: This enclosed steel hydraulic barking unit by Canadian Sumner Iron Works at Vancouver, B. C., which is installed at Universal Box Co., Marpole, B. C., removes bark from the large sawmill slabs in Pacific Coast mills and makes it economical to reduce these slabs to chips for pulp mills. Speedier and more efficient barker gives manufacturing utility to these slabs which were formerly of no use except for fuel. Up to 1400 p.s.i. water pressure is applied. The machine is 15 feet long, has speed rolls and press rolls, anti-friction bearings and variable speed motor.

A prominent mill engineer in Ohio said it is still questionable whether small roundwood hydraulic barkers in Eastern mills are more efficient than mechanical barking drums in that area, even though many have been installed, but hydraulic barking of both small and large logs pays in the Far West. The same power and pumps can be applied.

new Filer & Stowell free piston type of steam engine to drive the nozzle carriage at high speed.

Other Equipment

There have been numerous corrallary engineering developments of interest contemplating the barking machine, such as powerful 1,500 h.p. synchronous motors for chippers which Sumner Iron Works, for example, is making with discs up to 153 and 175-inch diameter. There is the elaborately complex but precise and automatic operator's board where one man controls entry, barking and exit of logs with a variety of push-buttons and levers. There is the suspended chip hopper with new and more efficient type of revolving plate feeder from chip storage to belt introduced at Puget Sound Pulp & Timber Co. and later at Soundview, illustrated on these pages. Also high capacity chip chains from chipper carrying double capacity in same space and with same power equipped with Electric Steel Foundry flights. There is the new and efficient all-steel log haul or double log haul with Esco chain and chairs. There is the complementary small wood and slab chippers.

What has made all this really possible has been the development of water pressures sufficiently great to do the barking job. For more than a quarter of a century pulp mill engineers have been trying to bark logs hydraulically. The answer to their dreams came with the development of the multiple stage pumps and auxiliary equipment capable of delivering from 900 to 1,500 gallons of water a minute at pressures up to 1,475 pounds per square inch.

Some unusual problems confronted engineers when Universal Box Co. at its Marpole, B. C., mill decided to have a Canadian Sumner Iron Works hydraulic slab barker installed to debark slab wood, subsequently to be cenverted into pulpwood chips. A Sumner 72" chipper is being installed to produce chips from clean slabs (See illustration).

The mill is on the Fraser River, where the water supply at certain seasons is fairly heavy with silt and with some salt. To meet this difficult pumping condition stainless steel was used in construction of the pumps. Booster pumps were provided to allow for the rise and fall of the tides. The river water is pumped through screens which are expected to remove most of the silt.

One of the most interesting problems encountered was the design of the nozzle tips for all types of barkers which would withstand the unusual abrasion. Heat - treated stainless steel and other special metals are used.

While the west coast has pioneered the hydraulic barker, eastern U. S. and Canada have developed the all-welded barking drum, and the dry chain barker and another innovation in wood handling is the belt conveyor now being extensively used to replace chain conveyors. At National Container in Jacksonville, Fla., "Judge" H. W. Carey, production manager, said their "silent" welded barker requires less maintenance than the riveted type, as no bolts are shaken loose.

Another important wood room development in the kraft industry has been the multiple-knife chipping which gives more uniformity of chips and higher production and in the kraft mills, in some cases, is expected to, or has done away with screens. Up to 400 tons a day production of chips was reported to PULP & PAPER Industry by one of the big Southern U. S. mills.

In the chip handling setup, the new Marathon kraft mill in Ontario has departed from the usual by eliminating the use of chip screens. The chipper is driven by a 500-horsepower unit direct connected. The chip bins, each with five out-

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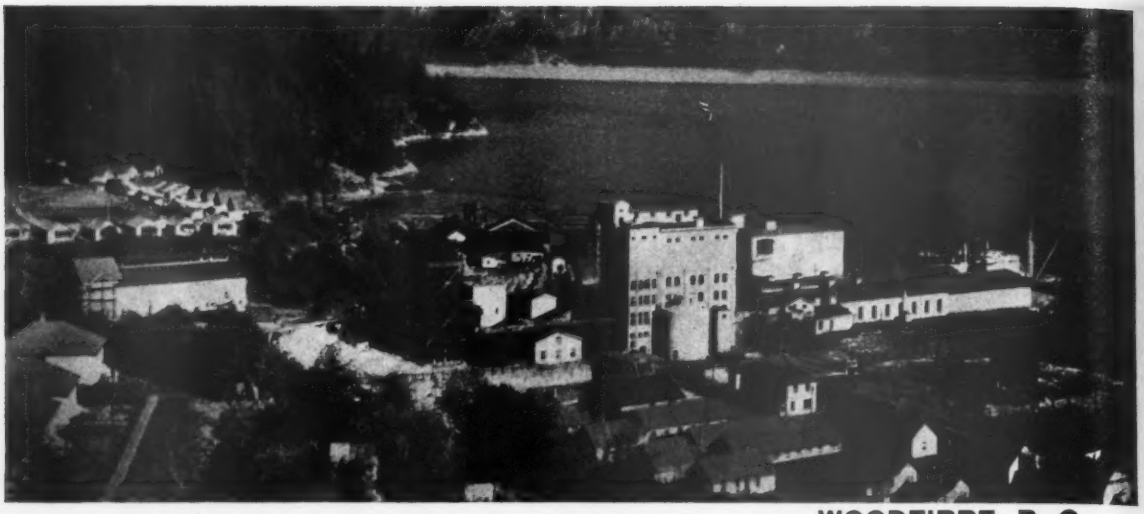
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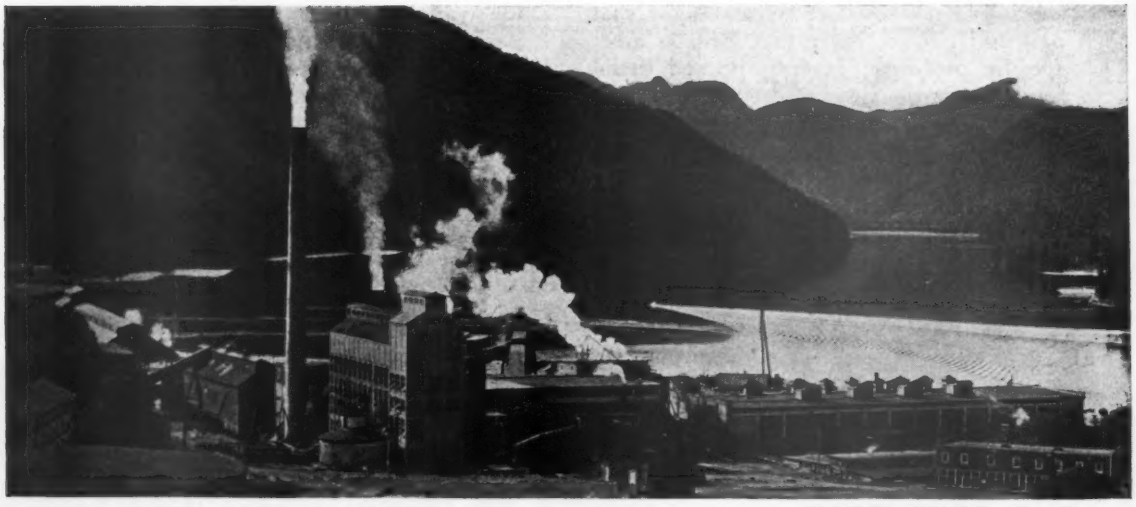
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HOW PULP DIVISION OF WEYERHAEUSER TBR CO. keeps accurate records on maintenance is described briefly in this engineering survey. Here at a Longview mill conference on maintenance costs (left to right) are: George Wolfe, Master Mechanic; M. Lowell Edwards, Plant Engineer; Paul F. Miescke, Office Manager; Al Leese, Accountant; W. H. Haverman, Sulfite Supt.; Svarre Hazelquist, Tech. Director; and Lou Bailey, Chief Electrician. Accumulative Maintenance Record cards lay on table. Mr. Leese has a Maintenance Detail Folder ready to hand group giving further cost details of specific item shown on Maintenance card, which is under discussion.

lets, and of saw-tooth design, are another interesting feature. Incidentally, so are Marathon's four stage completely inclosed brown stock washing system with preknotter set ahead of the washers of Impco design, and the provision for burning knots in recovery furnaces for the recovery of their full value of chemical contents and fuel.

Engineers have given considerable study to means of weighing wood chips for barked logs, and Fairbanks-Morse has developed belt conveyor scales for use either with a rubber belt or chain conveyor. A unique belt conveyor scale, first in Canada, has been installed at Marathon's Ontario mill for weighing wood chips.

MAINTENANCE ENGINEERING

Advancement in engineering in this industry is not taking place only in development of new equipment. In maintenance engineering great strides have been made.

In summarizing maintenance engineering progress, both American and Canadian mill engineers interviewed by PULP & PAPER editors stressed the new uses made of special materials and the extensive use of welding, to the use of spray metals and stainless clad material. Various synthetic resins are also used to a considerable extent in various equipment, piping, screen plates, etc., to provide cleanliness and longer life.

Weyerhaeuser System

There are no doubt many mills in the industry whose reputation and performance is of highest calibre. At least two that were mentioned were KVP in Michigan and the Crocker-Burbank mill in Fitchburg, Mass.

Before leaving the subject of maintenance, it might be well to record that several engineers said they felt top management should take a more vigorous interest and set up more specific and positive controls in authority and responsibility for maintenance, and also provide for closer cooperation between engineers and superintendents.

A maintenance cost system which provides complete and prompt information to plant engineers and mill operators has been developed over the years by the Pulp Division of Weyerhaeuser Timber Co. At request, it takes only a few minutes to present a complete factual history of maintenance cost by months and years of any piece of equipment, any division or a whole Weyerhaeuser plant.

A system of five digits is used for reference, the first two indicating a division, the next, a department or process, and the last two, an individual machine or item. Items common to all departments have the same numbers or if similar, like pumps, they will have the same first of the last two numbers. On one card, front and reverse, are lists costs for each item by months and for seven years. There is also an accumulative maintenance record card for departments and maintenance detail folders with three inserted forms—job detail labor summary, material summary and voucher summary. Because we think there is going to be considerable interest in this Weyerhaeuser system we will publish further details in a later issue.

In Mead Mills

George H. Pringle, visited in Chillicothe, O., where he is chief engineer of Mead's big Chillicothe division, noted the use of Johns Manville flange Transite (cement and asbestos product) piping for general uses in Mead's Chillicothe and Escanaba, Mich., mills. He said they found it as cheap as steel and a 450-lb. test could be put on it before the thread failed. Mead employes were machining the flanges themselves, doing their own threading, and men were especially assigned to lathes for this work. Said Mr. Pringle:

"We have to watch the pH with Transite pipe. We can go up to 10 or 12 on alkali side, down to 5 or 6 on acid and it can stand temperatures of 200 or better."

In Rayonier Mills

In explaining how Rayonier engineers discovered that moderatly expensive stainless alloys are economically feasible in wood rooms where wear is excessive, Meder Johnson, chief engineer, Rayonier Incorporated recalled:

" A number of years ago we conducted an experiment on the use of various alloys on the saw carriage. The wearing strips on the top of the head blocks wear quite rapidly on the outboard end where they come in contact with the logs and require frequent re-machining and replacement—the first being plain steel which we had previously used; the second was a high carbon alloy steel having a hard surface, and the third was 14% chromium which is classified as a stainless iron (Type 416).

"After a considerable period had elapsed the wear on each of the three types of steel was measured and it was found that the alloy steel was much better than mild steel, but both of these types showed considerable wear, whereas the 14% chrome showed practically no change except a slight rounding of the sharp edges.

"The added cost of the stainless was more than offset by greatly increased length of service. This experiment resulted in our replacing all of the wearing strips on the head block with 14% chrome and also the vertical wearing strips on the carriage knees.

"We then performed a similar ex-

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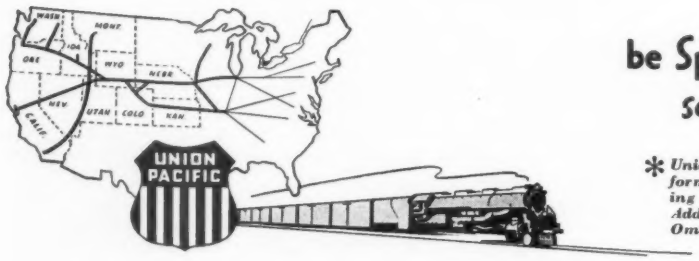
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Fact 1. Since V-J day, hundreds of industrial and commercial concerns have located factories, warehouses and distribution facilities on the Union Pacific right-of-way in the western states served by the railroad.

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UNION PACIFIC RAILROAD

The Strategic Middle Route

periment on the carriage trucks," said Mr. Johnson. "We have experienced excessive wear on the outer flat wheel and an appreciable wear on the middle flat wheel but very little wear on the V-wheel which is away from the log side of the carriage and is generally lubricated and free from dirt. As it is very necessary to have wheels of different diameters on the same axle, it is necessary to frequently remachine the trucks. To test the properties of the 14% chrome, one of the trucks was replaced with this alloy and after a period of service the wear was compared with the other trucks and the loss in diameter in the case of the alloy wheel was only a small fraction of the wear experienced on the mild steel. One of the other trucks had been fitted with a very hard alloy rim but this was found to give only slightly better wearing characteristics than mild steel. This experiment resulted in our changing all of the trucks to 14% chrome."

Rayonier engineers, in discussing engineering progress, also pointed to their use of quick change removable hubs on flexible couplings. Quite frequently it is necessary to install a spare motor or speed reducer in as short a time as possible and the spare unit often has a different size shaft than the unit it replaces. This results in time lost reboring or bushing the coupling.

It occurred to the Rayonier staff that this could be overcome by utilizing a removable hub on the type which is now becoming quite common on V-belt sheaves. These hubs have the straight bore on the inside to fit the shaft but the outer diameter is tapered and the bushing split so that when it is forced into the pulley hub it is compressed slightly and fits the shaft very tightly. When the pulley is again jacked off, the hub can be easily removed without hammering or the use of pullers.

Two sizes of disc type couplings were designed which are bored to receive standard V-belt pulley hubs, and a stock of hubs, bored and keyseated to fit all of the shaft sizes most commonly encountered in motors and speed reducers, is maintained in the mill store.

Rayonier has been following a program of gradually replacing worn out couplings with this type, which greatly expedites coupling changes. By standardizing on the same dimensions as are utilized by one of the large manufacturers of V-belt sheaves it is possible for Rayonier to obtain stock hubs on short notice for replacements.

Eastman Kodak's mill in New York and others have made considerable studies of surfaces best suited to carrying fibers and stock, particularly interior pipe surfaces. A manufacturer has made some studies along this line. Factors to consider apparently are power, consistency, type of stock, number of fittings involved and length of run.

Noncorrosive Materials in Machine

Monel and stainless steel are used extensively in the wet end of Black-Clawson Fourdrinier and cylinder machines. The principal application for such material is in the stock handling parts and such other parts as would be subject to rusting and corrosion and thus constructed of stainless material.

"Among the major items so affected are the B-C hydronamic pressure inlet and slice for Fourdrinier machines and open head boxes, with associated flat tapered venturi connection and associated stock piping," said S. A. Staege, B-C's veteran engineer.

"In the smaller installations solid stainless steel or Monel plate is used for all stock conducting parts whereas in some of the larger and heavier installations, stainless or Monel clad plate material is used with the Monel or stainless in contact with the stock and with the outside covered by suitable protective material," he added.

Fourdrinier rails and beams are Monel-covered with tightly fitting jackets completely protecting the steel beams from corrosion and eliminating any possibility of rust getting into the sheet.

White water trays and troughs and all such associated parts are of Monel or stainless construction.

Bolts and nuts are of non-rusting material, especially adjusting screws and parts which are to be operated frequently or occasionally.

In the case of cylinder machines the hydronamic inlets and venturi connections are again of stainless or Monel construction as well as the vat circle overflow compartment, etc., Mr. Staege pointed out.

Stainless steel and Monel are used almost exclusively in the construction of suction boxes of all sizes and types, both for Fourdrinier and cylinder machines.

CONSTRUCTION ENGINEERING

Modern welding methods as used in structural steel have been a feature of new building construction, and there has been an interesting use of glass bricks. Improvements in lighting, particularly by developments in fluorescent units whereby it is possible to increase lighting considerably by a great reduction in power, are features being incorporated by engineers in new mill construction. In connection with heating, notable gains have been made in unit heaters and indirect radiation buried in floors or walls.

Already described in this magazine is how Marathon built its new Ontario pulp mill with practically every operating department under a single roof and in applying color dynamics to the interior of the mill building according to pattern.

Blandin Paper Co. years ago set a precedent with its windowless building and this has particularly been a feature of Kimberly-Clark plants for their special cellulose products, in order to achieve highest degree of cleanliness and control of temperatures, etc.

A new trend has developed in the west toward permanence in construction of wood preparation plants, away from the wooden sawmill type of structure to concrete and steel, indicating a more permanent future outlook for the industry.

In the new Soundview Pulp Co. and Puget Sound Pulp & Timber Co. plants for wood preparation there are many departures from orthodox pulp mill and sawmill practice.

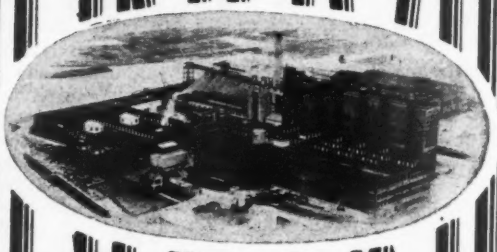
Soundview Structural Steel

For Soundview's barking and chipping plant, Isaacson Iron Works of Seattle was called upon to supply, fabricate and erect all the structural steel and this included the log haul, conveyor galleries and suspended chip bin bottoms as well as the main plant itself. The adaptability of structural steel in design proved of immense value.

For instance, all roll case beams and girts were designed as part of the structure as well as for supporting the rolls and gear boxes. Instead of erecting them with the rest of the structure, these members were diverted to the machinery manufacturers' shop where plates were welded on and planed in one unit for machinery mounting. Then the complete drilling, erection and lining up of the machinery was performed in the shop. The combined steel structure, with its machinery erected thereon, was shipped to the plant, set in place and bolted down as a



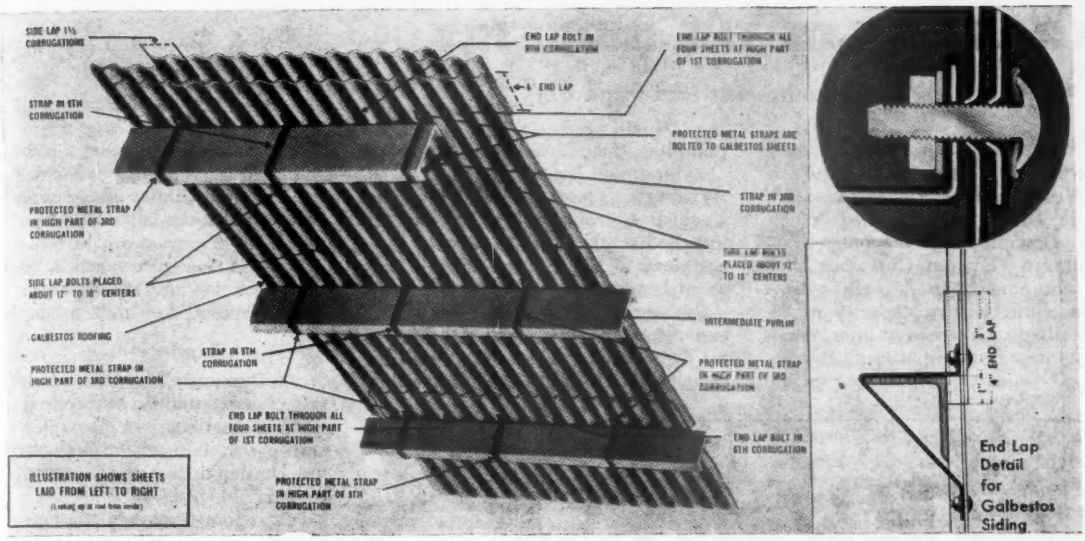
SOUNDVIEW



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SULPHITE PULP

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EVERETT WASHINGTON



HERE IS SHOWN how composite wall or roofing discussed by Chief Engineer McCarthy of St. Regis Paper Co. on these pages, is interlocked for weather tightness. This is H. H. Robertson Co.'s Galbestos. A type recommended for corrosive conditions and chemical buildings, etc., is made with steel core sheet which is given a zinc coating serving as an adhesive, with asbestos felt pressed on it while zinc is molten. This is impregnated with alphaltic solution and a tough heavy weatherproof coating is then optional, on one or both sides. Steel-zinc-felt bond is exceptionally tight. Lightweight, great strength and easy handling are advantages.

At left: How Galbestos is erected with Robertson protected metal straps, side-lap bolts and end-lap bolts. Number of straps may be varied depending on wind pressures.

Upper right: This shows cup-head bolt applied through overlapping sheets and ends of Galbestos strap fasteners to form permanent corrosion-proof assembly. When nut is run up tight the cup-head bolt is pulled down against asphalt-saturated asbestos felt washer, permanently sealing assembly at top. Pressure exudes asphalt from Galbestos coatings and heavy asphalt dip of the strap, effectively sealing bolt shaft and hole.

Lower right: Standard method of applying Galbestos siding. For siding, standard end-lap is 4 inches.

unit. This procedure saved many hours of tedious field labor and resulted in more accuracy of workmanship.

Foundations of this plant were the usual reinforced concrete type carried on wooden piling. But in this design as well as in the superstructure, a large factor was allowed for impact due to the rough handling of large and heavy western logs.

McCarthy Discusses Materials

Chief Engineer J. H. McCarthy, responsible for engineering at Soundview and now directing another new extensive construction program for St. Reris in Tacoma, Wash., has been quoted previously in this article on new structural possibilities. He said, further:

"For structures having wood or steel framework, there is now available an insulated wall composed of protected metal outside, 1½ inch of fiberglass insulation, with aluminum sheet inside. Other metal combinations are obtainable (see illustrations). This material comes with interlocking vertical joints for weather tightness and can be obtained in 24 inch widths in lengths up to 24 feet. The insulating value of such construction is stated to be equivalent to that of a 12 inch masonry wall, and it weighs 7 pounds per square foot. Masonry would run from 120 to 150 pounds per square foot of 12 inch wall. The saving in foundation concrete, piling, etc., will be greatly in favor of the insulated prefabricated wall. Ease of application and the growing scarcity of certain classes of efficient craftsmen, are other factors calling for careful weighing of material selection for large projects.

"Until lately probably no item of building construction has advanced so little as that of window installation," continued Mr. McCarthy. "In paper and pulp mills where water vapor is present inside the buildings, sometimes in combination with gases, inducing the formation of weak acids, wood sash have been installed and have gone out due to rot, sometimes in a few years. Steel sash have also proven very vulnerable targets for the atmospheric conditions in and around mills, especially those located near tidewater. In either case constant maintenance by the paint crew is a must.

"The designer contemplating the window problem in a new plant unit may select glass brick for light purposes, if his walls are of masonry. If his walls are composite as above described, he has available corrugated structural wire glass which may be obtained in lengths up to 8 feet in standard widths of about 30 inches. As many units of this glass as desired may be placed in a wall by merely providing structural angle irons on all four sides of each opening to which the edges may be bolted. Vertical joints between the adjacent sheets are made weatherproof with suitable sealing strips and the designer has a frameless window of extreme ruggedness on which the maintenance will be nil.

IN WOODS

Engineering in the woods means both advancement in mechanization and in organization. They are both important if the industry is going to succeed in tapping the great resources of farmer wood. Good forest practice by four million small woodlot owners in the U. S. could double the timber crop, according to Col. W. B. Greeley, former U. S. chief forester who now heads the American Forest Products Industries, Inc.

Power saws of various descriptions, portable pulpwood mills which operate in the woods with mechanical conveyor and handling equipment, large wood carriers, pulpwood grapples such as one that Blaw-Knox has supplied to pulp companies, Carco sulkies for wood skidding, tractors, etc., are among the types of equipment being used and developed.

Tugboats and alligator boats to facilitate the transportation of pulpwood logs from cutting sites to the mills have occupied the attention of engineers in recent years. Murray & Tregurtha units have won favor in Newfoundland and elsewhere.

EXPANSION OF THE INDUSTRY

(Continued from Page 67)

led Champion on-the-machine coating equipment, first of its kind on the West Coast and fabricated by Shartle Bros., and attached to its 84-in. Downingtown machine.

Standard Gypsum Co. assembled used equipment, an 85-inch cylinder machine, with a capacity of 35 tons daily, to make heavy liner, housed in a new building at Long Beach. U. S. Gypsum Co. was reported as planning installation of a large Downingtown board-felt machine at its South Gate plant. Irvington Varnish & Insulator Co., El Monte, installed a plant for processing paper, with a big coating machine to varnish and coat paper, as required.

Pioneer-Flintkote Co. began its expansion program during the critical days when the concentrated war industries of Southern California were making demands far beyond the company's ability to meet. Largest individual units added were two 150-ton Shartle-Dilts Hydrapulpers, driven by Terry steam turbines, and a Pusey & Jones Streamflow vat and mold. A 50-ton Hydrapulper was later installed for high grade liner.

Canadian Expansion

Demand for more production and higher quality of product presents a challenge to Canada's pulp and paper industry this year, and the challenge has been eagerly accepted.

Many of Canada's 109 operating mills have undertaken construction and installation programs during the past year designed to boost output and improve it, and with wartime restrictions largely eliminated real progress has been made in carrying these plans to completion.

As a result of changes made at various mills during the past few months, Canada will produce 200,000 tons more of newsprint this year, 25,000 tons more of fine paper, book and printing paper, over 50,000 tons more paperboard, 70,000 tons more mechanical pulp and more than 30,000 tons more chemical pulp, in addition to dissolving and soda pulps.

Every pulp and paper producing region in Canada and Newfoundland is currently witnessing expansion, with Ontario continuing to head the list because of the tremendous increase in new mill construction in the Lake Superior area.

The most important new development in British Columbia and one of great significance to the whole industry on the west coast is that of Celanese Corporation of America which announced plans in March for the establishment of a $15,000,000 plant near Prince Rupert, B. C., for the manufacture of purified cellulose for chemical purposes. The plant, which will employ 1,000 men, will produce daily 250 tons at first and 400 tons daily later, and the entire output will be shipped to the United States for yarn manufacture.

Another major project in British Columbia is that of Bloedel, Stewart & Welch, Ltd., whose 165-ton unbleached sulfate mill is expected to be in production at Port Alberni on the west coast of Vancouver Island during the summer of 1947.

There have been no moves toward carrying out the proposed sulfite pulp mill for the Milner interest at Giscome, near Prince George, B. C.,



and it must remain in the doubtful category.

Practically every company in British Columbia has a major expansion program under way. Pacific Mills, Ltd., at Ocean Falls, has installed new boilers and turbo-generators and has completed installation of a zinc hydrosulfite bleaching and washing system, as well as a continuous causticizing system and electrical alterations. It is increasing kraft and sulfate output by 35 tons each.

Powell River Co., in addition to ordering a new newsprint machine, is making extensive changes in its wood-handling system, notable for the installation of a Weyerhaeuser type hydraulic barker.

Sorg Pulp Co. will soon have completed a new pulp washing system and wood-handling program at its Port Mellon mill on Howe Sound.

Sidney Roofing & Paper Co. at Victoria is engaged in a $1,500,000 expansion program comprising installation of a paper machine and a $40,000 fibre rock plant.

Westminster Paper Co. has its new Beloit machine and other auxiliary units in operation, doubling capacity of the mill in paper specialties with production of 18,000 tons a year.

Bartram Paper Products, Ltd., completed a new $250,000 building addition in Vancouver, and in the same city St. Regis Paper Company built a new $200,000 building. National Paper Box Co. is also building a $250,000 plant in the British Columbia city.

In Ontario the biggest project now under way is that of LongLac Pulp & Paper Co. at Terrace, near Schreiber, where 1,500 men are now engaged in construction. Stadler, Hurter & Co. with Leonard Wayman of Chicago as consulting architect have designed the big new 250-ton sulfate mill and construction of power lines is rapidly progressing. Estimates of the total cost range as high as $20,000,000.

Construction crews are still "mopping up" three other major Ontario projects which went into production either late in 1945 or last year—the KVP Co., at Espanola, Red Rock division of Brompton Pulp & Paper Co. at Red Rock, and Marathon Paper Mills of Canada at Marathon. Most of the work remaining to be done at these three centers is in connection with townsite development.

The Howard Smith organization plans to modernize its Cornwall, Ont., mill to boost production of soda pulp and fine papers. The laminated plastics pilot plant will be moved from Cornwall to Montreal where the company has bought property at Ville La Salle. This will entail the building of a new plant. The company has decided to manufacture its laminated plastic "Arborite," in which one of the ingredients is lignin, on a commercial scale.

Several of the mills owned by Abitibi Power & Paper Co. in Ontario are undergoing extensive changes in line with the aggressive policy announced by that company following its release from receivership. About $2,500,000 has been appropriated for work at Smooth Rock Falls, Sturgeon Falls and Port Arthur (Thunder Bay).

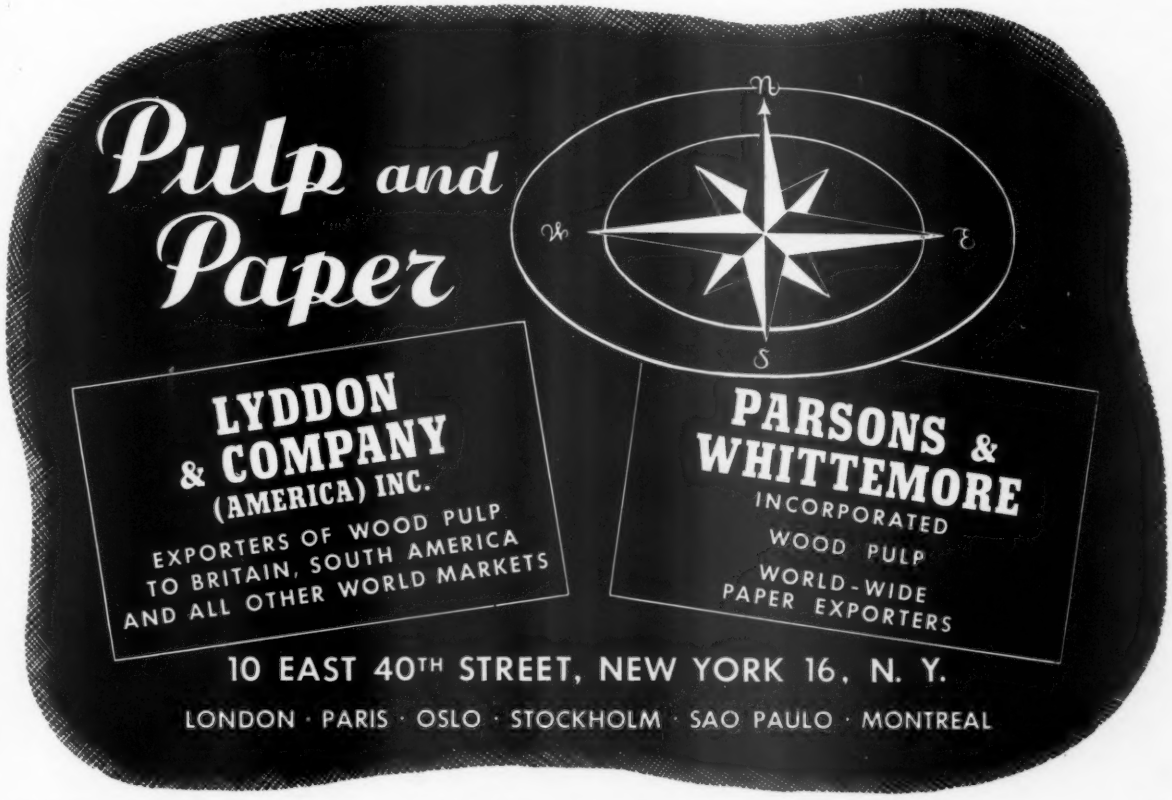
Great Lakes Paper Co. at Fort William has a $2,500,000 two-year program on schedule, including modernization of grinder equipment.

Canadian International Paper Co. and Minnesota & Ontario have also been engaged in reconstruction or new building.

Ontario Paper Co. has new suction couches installed at its Thorold mill under an arrangement whereby the Beaver Wood Fibre mill would swing back into newsprint production.

Dryden Paper Co. in western Ontario put up a new digester building and installed new machinery to increase tonnage.

This year may see a definite move towards establishment of a pulp mill



at Blind River, Ont., where Huron Forest Products, Ltd., was recently formed to take over the J. J. McFadden lumber interests. On the directorate are Hugh McKay, representatives of the Mead Corp., and E. P. Taylor, Toronto financier.

There has not been a great deal of new construction in Quebec, leading pulp and paper producing province, but most of the larger companies have modernized and installed new equipment.

The E. B. Eddy Co. at Hull has put in new barking drums and other wood-handling facilities, and the Wayagamack division of Consolidated Paper Mills, at Three Rivers, has installed a sextuple effect evaporator.

Brown Corp. at its La Tuque mill is proceeding with changes designed to increase its bleaching and alpha treating capacity so that it will eventually produce premium grades exclusively, except for some unbleached sufate for special uses.

Twelve new grinders were recently installed by Donohue Brothers at Nairn's Falls, Clermont, as part of a $350,000 modernization program.

At the Beauharnois mill of Howard Smith Paper Mills a new air dryer and winder and beating equipment were recently put in operation.

Price Bros. & Co. and Anglo-Canadian Pulp & Paper Co. also figure in 1947 expansion plans.

The coming year may see the Chicoutimi mill of Quebec Pulp & Paper Co. go into production, as the Quebec government is anxious to find a buyer who will provide another payroll in that section. The mill is now in government hands.

Plans were completed during the past few months for the resumption of operations at the Cap de la Madeleine mill of Consolidated Paper Corp., near Three Rivers, after several years of shutdown. It is understood that the mill will produce some newsprint as well as kraft for St. Regis Paper Co.

Brompton Pulp & Paper Co. recently announced plans to resume newsprint production at the company's Bromptonville mill in Quebec, and the machines are expected to be in operation by mid-summer. Under supervision of the Brompton engineering staff, a 160-inch newsprint machine was partly dismantled at the East Angus mill in 1931 is being reassembled.

New Brunswick has assumed a more conspicuous place in the current expansion picture in Canada by reason of developments at Fairville and Newcastle by the Fraser Companies and Saint John Sulfite, Ltd. Modernization of the St. John Sulfite mill will involve expenditure of about $750,000 over a two-year period and it is planned to spend about $300,000 this year.

Saint John Sulfite, Ltd., has had a $2,500,000 bond issue to assist in financing improvements at Fairville, acquired a year ago from the Port Royal Pulp & Paper Co. Initial capacity will be about 120 tons daily.

Bowater's Newfoundland Pulp & Paper Mills are carrying out a $10,000,000 program which will increase present production of newsprint from 250,000 to more than 350,000 tons a year. Another newsprint machine is being added to the battery of five, and sulfite drying equipment is also being increased.

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